Gravitational Corrections (GRS) for RED-SHIFT Observations with the

James Webb Space Telescope

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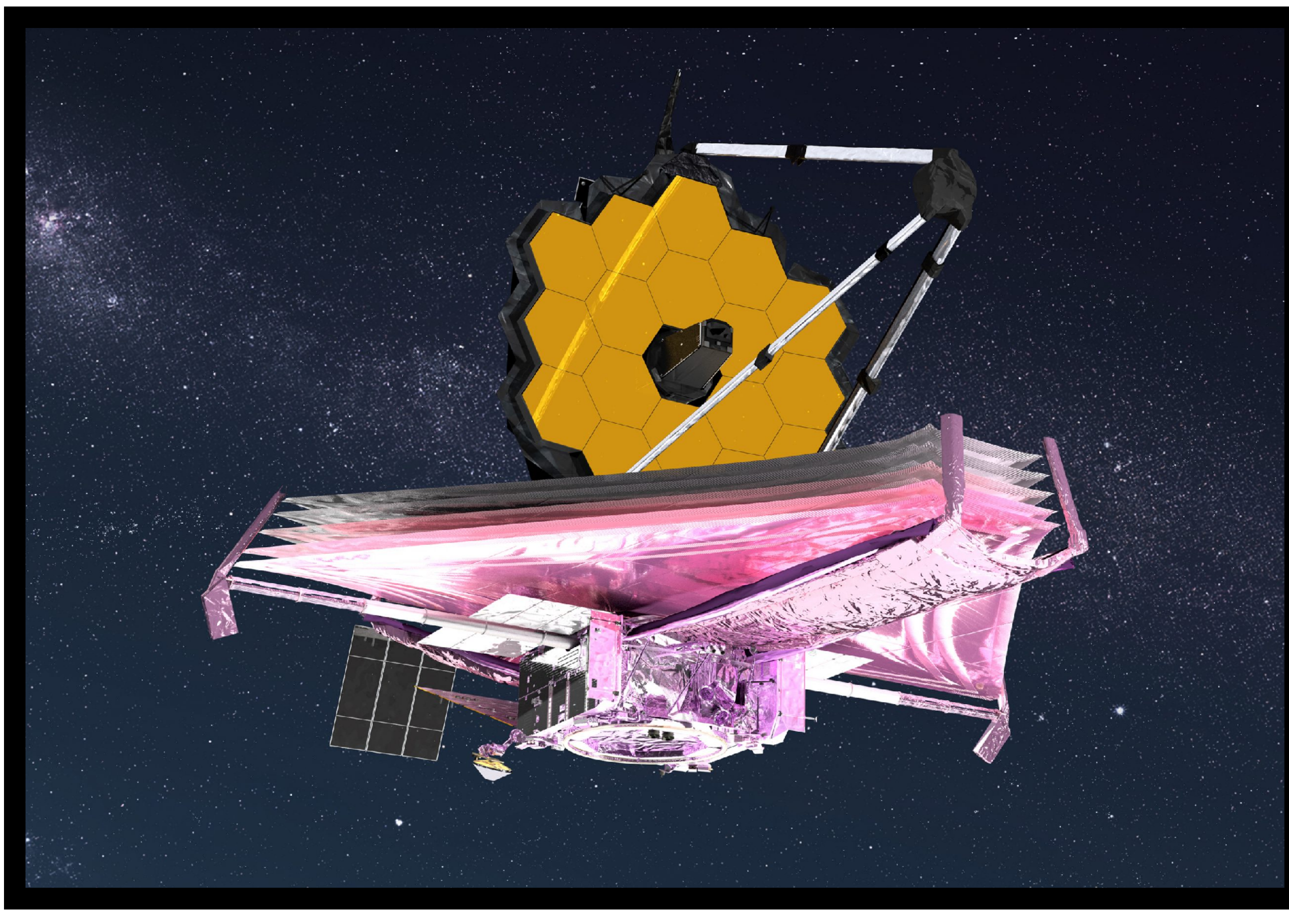

All calculations below belong to the book:
Rising of the James Webb Space Telescope

and its Fundamental Blindness:
All Calculations for Gravitational Intensity Shift
and Gravitational RedShift can be downloaded
from the Download Site:
https://quantumlight.science/

{ev} symbol for Electric Field Intensity Vector

{mv} symbol for Magnetic Field Intensity Vector

Run program by : Edit / Select All / Shift + Return

Example 1

(Propagation in the z – direction of a Laser –

Beam with the speed of light : $c = \frac{1}{\sqrt{\epsilon 0\, \mu 0}}$)

Book : Rising of the James Webb Space Telescope
and its Fundamental Blindness

Page 15, Equation (19)

$$-\frac{1}{c^2}\frac{\partial(\bar{\mathbf{E}}\times\bar{\mathbf{H}})}{\partial t} + \varepsilon_0\, \bar{\mathbf{E}}\,(\nabla . \bar{\mathbf{E}}) - \varepsilon_0\, \bar{\mathbf{E}}\times(\nabla\times\bar{\mathbf{E}}) +$$

$$+\mu_0\, \bar{\mathbf{H}}\,(\nabla . \bar{\mathbf{H}}) - \mu_0\, \bar{\mathbf{H}}\times(\nabla\times\bar{\mathbf{H}}) = 0 \qquad (19)$$

Example of a LASER – BEAM with a Gaussian Intensity divison $e^{-K2\sqrt{x^2+y^2}}$,
combined with an arbitrary division g[x, y] in the (x, y) plane , propagating in the
z – direction with the speed of light $c = \frac{1}{\sqrt{\epsilon 0\, \mu 0}}$.

In[ ]:=
```
Needs["DifferentialEquations`NDSolveProblems`"]
```

In[ ]:=
```
Needs["DifferentialEquations`NDSolveUtilities`"]
```

In[ ]:=
```
Needs["DifferentialEquations`InterpolatingFunctionAnatomy`"]
```

In[ ]:=
```
ϵ0 =.
```

In[ ]:=
```
μ0 =.
```

In[ ]:=
```
x =.
```

In[ ]:=
```
y =.
```

In[ ]:=
```
z =.
```

In[ ]:=
```
t =.
```

In[ ]:=
```
Get["VectorAnalysis`"]
```

— ⋯ General : VectorAnalysis` is now obsolete. The legacy version being loaded may conflict wit

In[ ]:=
```
InverseFunctions → True
```

Out[ ]= InverseFunctions → True

In[ ]:=
```
Needs["DifferentialEquations`NDSolveProblems`"]
```

In[ ]:=
```
Needs["DifferentialEquations`NDSolveUtilities`"]
```

In[ ]:=
```
Needs["DifferentialEquations`InterpolatingFunctionAnatomy`"]
```

In[ ]:=
```
SetCoordinates[Cartesian[x, y, z]]
```

Out[ ]= Cartesian[x, y, z]

In[ ]:=
```
{Coordinates[Cartesian], CoordinateRanges[Cartesian]}
```

Out[ ]= {{x, y, z}, {-∞ < x < ∞, -∞ < y < ∞, -∞ < z < ∞}}

In[ ]:= K2 = .

In[ ]:=
```
f[x, y] = g[x, y] ⅇ^(- K2 Sqrt[x^2 + y^2])
```

Out[ ]= $e^{-K2\sqrt{x^2+y^2}}\, g[x, y]$

In[ ]:=
```
ev = {f[x, y] * g[t - (K1 / z + 1) * z * Sqrt[ϵ0] * Sqrt[μ0]] , 0, 0}
```

Out[ ]= $\left\{e^{-K2\sqrt{x^2+y^2}}\, g\left[t - \left(1 + \frac{K1}{z}\right) z \sqrt{\epsilon 0}\, \sqrt{\mu 0}\right] \times g[x, y], 0, 0\right\}$

In[ ]:=
```
mv = (1 / Sqrt[μ0]) * Sqrt[ϵ0] *
  {0, f[x, y] * g[t - (K1 / z + 1) * z * Sqrt[ϵ0] * Sqrt[μ0]], 0}
```

Out[ ]= $\left\{0, \frac{e^{-K2\sqrt{x^2+y^2}}\, \sqrt{\epsilon 0}\, g\left[t - \left(1 + \frac{K1}{z}\right) z \sqrt{\epsilon 0}\, \sqrt{\mu 0}\right] \times g[x, y]}{\sqrt{\mu 0}}, 0\right\}$

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Example of a LASER – BEAM with a Gaussian Intensity divison $e^{-K2\sqrt{x^2+y}}$

combined with an arbitrary division g[x, y] in the (x, y) plane , propagating i

The input for the Electric Field Intensity {E (x, y, z,) = ev } and the Magnetic Field Inte
{H (x, y, z,) = mv} has been substituted in the Field Equation for the Electromagnetic F

$$-\frac{1}{c^2}\frac{\partial(\bar{\mathbf{E}}\times\bar{\mathbf{H}})}{\partial t}+\varepsilon_0\,\bar{\mathbf{E}}\,(\nabla.\bar{\mathbf{E}})-\varepsilon_0\,\bar{\mathbf{E}}\times(\nabla\times\bar{\mathbf{E}})+\mu_0\,\bar{\mathbf{H}}\,(\nabla.\bar{\mathbf{H}})-\mu_0\,\bar{\mathbf{H}}\times(\nabla\times\bar{\mathbf{H}})=0 \quad \text{Equation}$$

Which can be written as :

$$\text{term1} = -\frac{1}{c^2}\frac{\partial(\bar{E}\times\bar{H})}{\partial t}$$

$$\text{term 2} = \varepsilon_0\,\bar{E}\,(\nabla.\bar{E})$$

$$\text{term3} = -\varepsilon_0\,\bar{E}\times(\nabla\times\bar{E})$$

$$\text{term4} = \mu_0\,\bar{H}\,(\nabla.\bar{H})$$

$$\text{term5} = -\mu_0\,\bar{H}\times(\nabla\times\bar{H})$$

Equation (19) equals :

term1 + term2 + term3 + term4 + term5 = 0

In[ ]:=
```
Div[ev]
```

Out[ ]= $-\frac{e^{-K2\sqrt{x^2+y^2}}\,K2\,x\,g\left[t-\left(1+\frac{K1}{z}\right)z\sqrt{\epsilon0}\sqrt{\mu0}\right]\times g[x,y]}{\sqrt{x^2+y^2}}+e^{-K2\sqrt{x^2+y^2}}\,g\left[t-\left(1+\frac{K1}{z}\right)z\sqrt{\epsilon0}\right.$

In[ ]:=
```
Div[mv]
```

Out[ ]= $-\frac{e^{-K2\sqrt{x^2+y^2}}\ K2\ y\ \sqrt{\epsilon 0}\ g\left[t-\left(1+\frac{K1}{z}\right)z\sqrt{\epsilon 0}\ \sqrt{\mu 0}\right]\times g[x,y]}{\sqrt{x^2+y^2}\ \sqrt{\mu 0}}+\frac{e^{-K2\sqrt{x^2+y^2}}\ \sqrt{\epsilon 0}\ g\left[t-\left(1+\right.\right.}{}$

In[ ]:=
```
FullSimplify[%]
```

Out[ ]= $\frac{e^{-K2\sqrt{x^2+y^2}}\ \sqrt{\epsilon 0}\ g\left[t-(K1+z)\sqrt{\epsilon 0}\ \sqrt{\mu 0}\right]\left(-K2\ y\ g[x,y]+\sqrt{x^2+y^2}\ g^{(0,1)}[x,y]\right)}{\sqrt{x^2+y^2}\ \sqrt{\mu 0}}$

In[ ]:=
```
term1a = D[Cross[ev, mv], t]
```

Out[ ]= $\left\{0,0,\frac{2\,e^{-2K2\sqrt{x^2+y^2}}\ \sqrt{\epsilon 0}\ g\left[t-\left(1+\frac{K1}{z}\right)z\sqrt{\epsilon 0}\ \sqrt{\mu 0}\right]g[x,y]^2\ g'\left[t-\left(1+\frac{K1}{z}\right)z\sqrt{\epsilon 0}\ \sqrt{\mu\right.\right.}{\sqrt{\mu 0}}\right.$

$$\text{term1} = -\frac{1}{c^2}\frac{\partial(\bar{E}\times\bar{H})}{\partial t}$$

In[ ]:=
```
term1 = ((-ϵ0) * μ0) * D[Cross[ev, mv], t]
```

Out[ ]= $\left\{0,0,-2\,e^{-2K2\sqrt{x^2+y^2}}\ \epsilon 0^{3/2}\ \sqrt{\mu 0}\ g\left[t-\left(1+\frac{K1}{z}\right)z\sqrt{\epsilon 0}\ \sqrt{\mu 0}\right]g[x,y]^2\ g'\left[t-\left(1+\frac{K1}{z}\right)z\right.\right.$

In[ ]:=

$$\text{term 2} = \varepsilon_0\,\bar{E}\,(\nabla.\bar{E}).$$

In[ ]:=
```
term2 = ϵ0 * ev * Div[ev]
```

Out[ ]= $\left\{e^{-K2\sqrt{x^2+y^2}}\ \epsilon 0\ g\left[t-\left(1+\frac{K1}{z}\right)z\sqrt{\epsilon 0}\ \sqrt{\mu 0}\right]\times g[x,y]\left(-\frac{e^{-K2\sqrt{x^2+y^2}}\ K2\ x\ g\left[t-\left(1+\frac{K1}{z}\right)z\right.}{\sqrt{x^2+y^2}}\right.\right.$

$$\text{term3} = -\varepsilon_0\,\bar{E}\times(\nabla\times\bar{E})$$

In[ ]:=
```
term3 = (-ϵ0) * Cross[ev, Curl[ev]]
```

Out[ ]= $\left\{0,\ -\epsilon 0 \left(-\frac{e^{-2\,K2\,\sqrt{x^2+y^2}}\ K2\ y\ g\left[t-\left(1+\frac{K1}{z}\right)\ z\ \sqrt{\epsilon 0}\ \sqrt{\mu 0}\right]^2 g[x,y]^2}{\sqrt{x^2+y^2}} + e^{-2\,K2\,\sqrt{x^2+y^2}}\ g\left[t-\left(1\right.\right.\right.\right.$

$e^{-2\,K2\,\sqrt{x^2+y^2}}\ \epsilon 0^{3/2}\ \sqrt{\mu 0}\ g\left[t-\left(1+\frac{K1}{z}\right)\ z\ \sqrt{\epsilon 0}\ \sqrt{\mu 0}\right]\ g[x,y]^2\ g'\left[t-\left(1+\frac{K1}{z}\right)\ z\ \sqrt{\epsilon 0}\ \sqrt{\mu 0}\right.$

$$\text{term4} = \mu_0\ \overline{H}\ (\nabla .\ \overline{H})$$

In[ ]:=
```
term4 = μ0 * mv * Div[mv]
```

Out[ ]= $\left\{0,\ e^{-K2\,\sqrt{x^2+y^2}}\ \sqrt{\epsilon 0}\ \sqrt{\mu 0}\ g\left[t-\left(1+\frac{K1}{z}\right)\ z\ \sqrt{\epsilon 0}\ \sqrt{\mu 0}\right] \times g[x,y] \left(-\frac{e^{-K2\,\sqrt{x^2+y^2}}\ K2\ y\ \sqrt{\epsilon 0}\ g}{}\right.\right.$

$$\text{term5} = -\mu_0\ \overline{H} \times (\nabla \times \overline{H})$$

In[ ]:=
```
term5 = (-μ0) * Cross[mv, Curl[mv]]
```

Out[ ]= $\left\{-\mu 0 \left(-\frac{e^{-2\,K2\,\sqrt{x^2+y^2}}\ K2\ x\ \epsilon 0\ g\left[t-\left(1+\frac{K1}{z}\right)\ z\ \sqrt{\epsilon 0}\ \sqrt{\mu 0}\right]^2 g[x,y]^2}{\sqrt{x^2+y^2}\ \mu 0} + \frac{e^{-2\,K2\,\sqrt{x^2+y^2}}\ \epsilon 0\ g[t-}{}\right.\right.$

$0,\ e^{-2\,K2\,\sqrt{x^2+y^2}}\ \epsilon 0^{3/2}\ \sqrt{\mu 0}\ g\left[t-\left(1+\frac{K1}{z}\right)\ z\ \sqrt{\epsilon 0}\ \sqrt{\mu 0}\right]\ g[x,y]^2\ g'\left[t-\left(1+\frac{K1}{z}\right)\ z\ \sqrt{\epsilon 0}\right.$

$$-\frac{1}{c^2}\frac{\partial(\bar{\mathbf{E}}\times\bar{\mathbf{H}})}{\partial t}+\varepsilon_0\,\bar{\mathbf{E}}\,(\nabla.\bar{\mathbf{E}})-\varepsilon_0\,\bar{\mathbf{E}}\times(\nabla\times\bar{\mathbf{E}})+\mu_0\,\bar{\mathbf{H}}\,(\nabla.\bar{\mathbf{H}})-\mu_0\,\bar{\mathbf{H}}\times(\nabla\times\bar{\mathbf{H}})=0$$: Book Pag

Which can be written as :

$$\text{term1} = -\frac{1}{c^2}\frac{\partial(\bar{E}\times\bar{H})}{\partial t}$$

$$\text{term 2} = \varepsilon_0\,\bar{E}\,(\nabla.\bar{E})$$

$$\text{term3} = -\varepsilon_0\,\bar{E}\times(\nabla\times\bar{E})$$

$$\text{term4} = \mu_0\,\bar{H}\,(\nabla.\bar{H})$$

$$\text{term5} = -\mu_0\,\bar{H}\times(\nabla\times\bar{H})$$

Equation (19) equals :

$$\text{term1} + \text{term2} + \text{term3} + \text{term4} + \text{term5} = 0$$

In[ ]:=
```
vergelijking = term1 + term2 + term3 + term4 + term5
```

Out[ ]=

$$\Big\{e^{-K2\sqrt{x^2+y^2}}\,\epsilon 0\,g\Big[t-\Big(1+\frac{K1}{z}\Big)\,z\,\sqrt{\epsilon 0}\,\sqrt{\mu 0}\Big]\times g[x,y]\Bigg(-\frac{e^{-K2\sqrt{x^2+y^2}}\,K2\,x\,g\Big[t-\Big(1+\frac{K1}{z}\Big)\,z\,\cdots}{\sqrt{x^2+y^2}}$$

$$\mu 0\Bigg(-\frac{e^{-2\,K2\sqrt{x^2+y^2}}\,K2\,x\,\epsilon 0\,g\Big[t-\Big(1+\frac{K1}{z}\Big)\,z\,\sqrt{\epsilon 0}\,\sqrt{\mu 0}\Big]^2\,g[x,y]^2}{\sqrt{x^2+y^2}\,\mu 0}+\frac{e^{-2\,K2\sqrt{x^2+y^2}}\,\epsilon 0\,g\Big[t-\cdots}{\cdots}$$

$$e^{-K2\sqrt{x^2+y^2}}\,\sqrt{\epsilon 0}\,\sqrt{\mu 0}\,g\Big[t-\Big(1+\frac{K1}{z}\Big)\,z\,\sqrt{\epsilon 0}\,\sqrt{\mu 0}\Big]\times g[x,y]\Bigg(-\frac{e^{-K2\sqrt{x^2+y^2}}\,K2\,y\,\sqrt{\epsilon 0}\,g\Big[t\cdots}{\sqrt{x\cdots}}$$

$$\epsilon 0\Bigg(-\frac{e^{-2\,K2\sqrt{x^2+y^2}}\,K2\,y\,g\Big[t-\Big(1+\frac{K1}{z}\Big)\,z\,\sqrt{\epsilon 0}\,\sqrt{\mu 0}\Big]^2\,g[x,y]^2}{\sqrt{x^2+y^2}}+e^{-2\,K2\sqrt{x^2+y^2}}\,g\Big[t-\Big(1+\cdots$$

In[ ]:=

The electromagnetic force density in the x - direction equals :

In[ ]:=
```
xvergelijking = term1[[1]] + term2[[1]] + term3[[1]] + term4[[1]] +
  term5[[1]]
```

Out[ ]= $e^{-K2\sqrt{x^2+y^2}}\,\epsilon0\,g\left[t-\left(1+\frac{K1}{z}\right)z\sqrt{\epsilon0}\sqrt{\mu0}\right]\times g[x,y]\left(-\frac{e^{-K2\sqrt{x^2+y^2}}\,K2\,x\,g\left[t-\left(1+\frac{K1}{z}\right)z\sqrt{\right.}\right.}{\sqrt{x^2+y^2}}\right.$

$\mu0\left(-\frac{e^{-2K2\sqrt{x^2+y^2}}\,K2\,x\,\epsilon0\,g\left[t-\left(1+\frac{K1}{z}\right)z\sqrt{\epsilon0}\sqrt{\mu0}\right]^2 g[x,y]^2}{\sqrt{x^2+y^2}\,\mu0}+\frac{e^{-2K2\sqrt{x^2+y^2}}\,\epsilon0\,g[t-(}{}\right.$

In[ ]:=
```
FullSimplify[%]
```

Out[ ]= 0

In[ ]:=
```
xvergelijking1 = %
```

Out[ ]= 0

The electromagnetic force density in the y - direction equals:

In[ ]:=
```
yvergelijking = term1[[2]] + term2[[2]] + term3[[2]] + term4[[2]] +
  term5[[2]]
```

Out[ ]= $e^{-K2\sqrt{x^2+y^2}}\sqrt{\epsilon0}\sqrt{\mu0}\,g\left[t-\left(1+\frac{K1}{z}\right)z\sqrt{\epsilon0}\sqrt{\mu0}\right]\times g[x,y]\left(-\frac{e^{-K2\sqrt{x^2+y^2}}\,K2\,y\sqrt{\epsilon0}\,g[t-}{\sqrt{x^2}}\right.$

$\epsilon0\left(-\frac{e^{-2K2\sqrt{x^2+y^2}}\,K2\,y\,g\left[t-\left(1+\frac{K1}{z}\right)z\sqrt{\epsilon0}\sqrt{\mu0}\right]^2 g[x,y]^2}{\sqrt{x^2+y^2}}+e^{-2K2\sqrt{x^2+y^2}}\,g\left[t-\left(1+\frac{K1}{z}\right.\right.\right.$

In[ ]:=
```
FullSimplify[%]
```

Out[ ]= 0

In[ ]:=
```
yvergelijking1 = %
```

Out[ ]= 0

The electromagnetic force density in the z - direction equals :

In[ ]:=
```
zvergelijking = term1⟦3⟧ + term2⟦3⟧ + term3⟦3⟧ + term4⟦3⟧ +
  term5⟦3⟧
```
Out[ ]= 0

In[ ]:=
```
FullSimplify[%]
```
Out[ ]= 0

In[ ]:=
```
zvergelijking1 = %
```
Out[ ]= 0

Results for the electromagentic force densities in resp x-direction, y-direction, z-direction:

In[ ]:=
```
xvergelijking1
```
Out[ ]= 0

In[ ]:=
```
yvergelijking1
```
Out[ ]= 0

In[ ]:=
```
zvergelijking1
```
Out[ ]= 0

According the force-density equations in the x-direction, y-direction a
every direction. This Perfect Equilibrium does only exist when the El
represents the solution for equation (19) on page 16.

Example 2

Propagation of a Beam of Light in the z-direction with t speed of light: $c = \frac{1}{\sqrt{\epsilon 0 \, \mu 0}}$ within a constant gravitational field, oriented in the z-d Gravitational Redshift.

In[ ]:=

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Example of a Spherical Beam of Light , propagating in the radial – di

with the speed of light $c = \frac{1}{\sqrt{\epsilon 0\, \mu 0}}$.

The input for the Electric Field Intensity {E (x, y, z,) = ev } and the Magnetic F
Equation for the Electromagnetic Field within a constant gravitational field with a

$$-\frac{1}{c^2}\frac{\partial(\bar{E}\times\bar{H})}{\partial t} + \varepsilon_0\, \bar{E}\,(\nabla.\bar{E}) - \varepsilon_0\, \bar{E}\times(\nabla\times\bar{E}) + \mu_0\, \bar{H}\,(\nabla.\bar{H}) - \mu_0\, \bar{H}\times(\nabla\times\bar{H}) + \frac{1}{2}\Big(\varepsilon^2$$

Which can be written as :

$$\text{term1} = -\frac{1}{c^2}\frac{\partial(\bar{E}\times\bar{H})}{\partial t}$$

$$\text{term 2} = \varepsilon_0\, \bar{E}\,(\nabla.\bar{E})$$

$$\text{term3} = -\varepsilon_0\, \bar{E}\times(\nabla\times\bar{E})$$

$$\text{term4} = \mu_0\, \bar{H}\,(\nabla.\bar{H})$$

$$\text{term5} = -\mu_0\, \bar{H}\times(\nabla\times\bar{H})$$

$$\text{term6} = -\frac{1}{2}\left(\varepsilon^2\mu\left(\bar{E}.\bar{E}\right) + \varepsilon\,\mu^2\left(\bar{H}.\bar{H}\right)\right)\bar{g}$$

Equation (73) equals :

$$\text{term1} + \text{term2} + \text{term3} + \text{term4} + \text{term5} + \text{term6} = 0$$

In[ ]:= $\epsilon 0$ =.

In[ ]:= $\mu 0$ =.

In[ ]:= x =.

In[ ]:= y =.

In[ ]:= z =.

In[ ]:= t =.

In[ ]:= Get["VectorAnalysis`"]

— General : VectorAnalysis` is now obsolete. The legacy version being loaded may conflict wit

In[ ]:= Get["Calculus`DSolve`"]

— Get : Cannot open Calculus`DSolve`.

Out[ ]= $Failed

In[ ]:= InverseFunctions → True

Out[ ]= InverseFunctions → True

In[ ]:= Needs["DifferentialEquations`NDSolveProblems`"]

In[ ]:= Needs["DifferentialEquations`NDSolveUtilities`"]

In[ ]:= Needs["DifferentialEquations`InterpolatingFunctionAnatomy`"]

In[ ]:= Get["Calculus`DSolveIntegrals`"]

— Get : Cannot open Calculus`DSolveIntegrals`.

Out[ ]= $Failed

In[ ]:= SetCoordinates[Cartesian[x, y, z]]

Out[ ]= Cartesian[x, y, z]

In[ ]:= {Coordinates[Cartesian], CoordinateRanges[Cartesian]}

Out[ ]= $\{\{x, y, z\}, \{-\infty < x < \infty, -\infty < y < \infty, -\infty < z < \infty\}\}$

In[ ]:= G1 = .

In[ ]:= $ev = \left\{e^{-\frac{1}{2} G1\, z\, \epsilon0\, \mu0}\, g\left[e^{-G1\, \epsilon0\, \mu0} \left(t - z \sqrt{\epsilon0}\, \sqrt{\mu0}\right)\right], 0, 0\right\}$

Out[ ]= $\left\{e^{-\frac{1}{2} G1\, z\, \epsilon0\, \mu0}\, g\left[e^{-G1\, \epsilon0\, \mu0} \left(t - z \sqrt{\epsilon0}\, \sqrt{\mu0}\right)\right], 0, 0\right\}$

In[ ]:= $mv = (1/Sqrt[\mu0]) * Sqrt[\epsilon0] * \left\{0, e^{-\frac{1}{2} G1\, z\, \epsilon0\, \mu0}\, g\left[e^{-G1\, \epsilon0\, \mu0} \left(t - z \sqrt{\epsilon0}\, \sqrt{\mu0}\right)\right], 0\right\}$

Out[ ]= $\left\{0, \frac{e^{-\frac{1}{2} G1\, z\, \epsilon0\, \mu0} \sqrt{\epsilon0}\, g\left[e^{-G1\, \epsilon0\, \mu0} \left(t - z \sqrt{\epsilon0}\, \sqrt{\mu0}\right)\right]}{\sqrt{\mu0}}, 0\right\}$

In[ ]:= gv = {0, 0, G1}

Out[ ]= {0, 0, G1}

In[ ]:= $Intensity = -\frac{1}{2} \left(\epsilon0\, (Dot[ev, ev]) + \mu0\, (Dot[mv, mv])\right)$

Out[ ]= $-\frac{1 \left(e^{-G1\, z\, \epsilon0\, \mu0}\, \epsilon0\, g\left[e^{-G1\, \epsilon0\, \mu0} \left(t - z \sqrt{\epsilon0}\, \sqrt{\mu0}\right)\right]^2 + e^{-G1\, z\, \epsilon0\, \mu0}\, g\left[e^{-G1\, \epsilon0\, \mu0} \left(t - z \sqrt{\epsilon0}\, \sqrt{\mu0}\right)\right.\right.}{2}$

In[ ]:= FullSimplify[%]

Out[ ]= $-\frac{e^{-G1\, z\, \epsilon0\, \mu0}\, g\left[e^{-G1\, \epsilon0\, \mu0} \left(t - z \sqrt{\epsilon0}\, \sqrt{\mu0}\right)\right]^2 1 \left(\epsilon0 + \epsilon0\right)}{2}$

In[ ]:= Div[ev]

Out[ ]= 0

In[ ]:= Div[mv]

Out[ ]= 0

In[ ]:= FullSimplify[%]

Out[ ]= 0

In[ ]:= term1a = D[Cross[ev, mv], t]

Out[ ]= $\left\{0, 0, \frac{2\, e^{-G1\,\epsilon0\,\mu0 - G1\,z\,\epsilon0\,\mu0}\,\sqrt{\epsilon0}\; g\left[e^{-G1\,\epsilon0\,\mu0}\left(t - z\,\sqrt{\epsilon0}\,\sqrt{\mu0}\right)\right]\, g'\left[e^{-G1\,\epsilon0\,\mu0}\left(t - z\,\sqrt{\epsilon0}\,\sqrt{\mu0}\right.\right.}{\sqrt{\mu0}}\right.$

In[ ]:=

$$\text{term1} = -\frac{1}{c^2}\,\frac{\partial(\bar{E}\times\bar{H})}{\partial t}\,.$$

In[ ]:= term1 = ((−ϵ0) ∗ μ0) ∗ D[Cross[ev, mv], t]

Out[ ]= $\left\{0, 0, -2\, e^{-G1\,\epsilon0\,\mu0 - G1\,z\,\epsilon0\,\mu0}\,\epsilon0^{3/2}\,\sqrt{\mu0}\; g\left[e^{-G1\,\epsilon0\,\mu0}\left(t - z\,\sqrt{\epsilon0}\,\sqrt{\mu0}\right)\right]\, g'\left[e^{-G1\,\epsilon0\,\mu0}\left(t - z\,\sqrt{\epsilon\right.\right.\right.$

In[ ]:=

$$\text{term2} = \varepsilon_0\,\bar{E}\,(\nabla\cdot\bar{E})\,.$$

In[ ]:= term2 = ϵ0 ∗ ev ∗ Div[ev]

Out[ ]= {0, 0, 0}

In[ ]:=

$$\text{term3} = -\varepsilon_0\,\bar{E}\times(\nabla\times\bar{E})\,.$$

In[ ]:= term3 = (−ϵ0) ∗ Cross[ev, Curl[ev]]

Out[ ]= $\{0, 0, -\epsilon0 \left(-\frac{1}{2} e^{-G1\, z\, \epsilon0\, \mu0}\, G1\, \epsilon0\, \mu0\, g\left[e^{-G1\, \epsilon0\, \mu0} \left(t - z\sqrt{\epsilon0}\, \sqrt{\mu0}\right)\right]^2 - e^{-G1\, \epsilon0\, \mu0 - G1\, z\, \epsilon0\, \mu0} \sqrt{\epsilon0}$

In[ ]:=

$$\text{term4} = \mu_0\, \overline{H}\, (\nabla . \overline{H})\, .$$

In[ ]:= term4 = μ0 ∗ mv ∗ Div[mv]

Out[ ]= {0, 0, 0}

In[ ]:=

$$\text{term5} = -\mu_0\, \overline{H} \times (\nabla \times \overline{H})\, .$$

In[ ]:= term5 = (−μ0) ∗ Cross[mv, Curl[mv]]

Out[ ]= $\{0, 0, -\mu0 \left(-\frac{1}{2} e^{-G1\, z\, \epsilon0\, \mu0}\, G1\, \epsilon0^2\, g\left[e^{-G1\, \epsilon0\, \mu0} \left(t - z\sqrt{\epsilon0}\, \sqrt{\mu0}\right)\right]^2 - \frac{e^{-G1\, \epsilon0\, \mu0 - G1\, z\, \epsilon0\, \mu0}\, \epsilon0^{3/2}}{}\right.$

$$\text{term6} = -\frac{1}{2}\left(\varepsilon^2\, \mu\left(\overline{E} . \overline{E}\right) + \varepsilon\, \mu^2\left(\overline{H} . \overline{H}\right)\right)\overline{g}$$

In[ ]:= $\text{term6} = -\left(\frac{\epsilon0^2\, \mu0}{2}\, \text{Dot[ev, ev]} + \frac{\epsilon0\, \mu0^2}{2}\, \text{Dot[mv, mv]}\right) \text{gv}$

Out[ ]= $\{0, 0, -e^{-G1\, z\, \epsilon0\, \mu0}\, G1\, \epsilon0^2\, \mu0\, g\left[e^{-G1\, \epsilon0\, \mu0} \left(t - z\sqrt{\epsilon0}\, \sqrt{\mu0}\right)\right]^2\}$

In[ ]:= vergelijking = term1 + term2 + term3 + term4 + term5 + term6

Out[ ]= $\{0, 0, -e^{-G1\, z\, \epsilon0\, \mu0}\, G1\, \epsilon0^2\, \mu0\, g\left[e^{-G1\, \epsilon0\, \mu0} \left(t - z\sqrt{\epsilon0}\, \sqrt{\mu0}\right)\right]^2 - 2\, e^{-G1\, \epsilon0\, \mu0 - G1\, z\, \epsilon0\, \mu0}\, \epsilon0^{3/2} \sqrt{\mu0}$

$\mu0 \left(-\frac{1}{2} e^{-G1\, z\, \epsilon0\, \mu0}\, G1\, \epsilon0^2\, g\left[e^{-G1\, \epsilon0\, \mu0} \left(t - z\sqrt{\epsilon0}\, \sqrt{\mu0}\right)\right]^2 - \frac{e^{-G1\, \epsilon0\, \mu0 - G1\, z\, \epsilon0\, \mu0}\, \epsilon0^{3/2}\, g\left[e^{-G1}\right.}{}\right.$

$\epsilon0 \left(-\frac{1}{2} e^{-G1\, z\, \epsilon0\, \mu0}\, G1\, \epsilon0\, \mu0\, g\left[e^{-G1\, \epsilon0\, \mu0} \left(t - z\sqrt{\epsilon0}\, \sqrt{\mu0}\right)\right]^2 - e^{-G1\, \epsilon0\, \mu0 - G1\, z\, \epsilon0\, \mu0} \sqrt{\epsilon0}\, \sqrt{\mu0}\right.$

In[ ]:=

The electromagnetic force density in the x - direction equals :

In[ ]:=
```
xvergelijking = term1⟦1⟧ + term2⟦1⟧ + term3⟦1⟧ + term4⟦1⟧ +
  term5⟦1⟧ + term6⟦1⟧
```

Out[ ]= 0

In[ ]:=
```
FullSimplify[%]
```

Out[ ]= 0

In[ ]:=
```
xvergelijking1 = %
```

Out[ ]= 0

In[ ]:=

The electromagnetic force density in the y - direction equals :

In[ ]:=
```
yvergelijking = term1⟦2⟧ + term2⟦2⟧ + term3⟦2⟧ + term4⟦2⟧ +
  term5⟦2⟧ + term6⟦2⟧
```

Out[ ]= 0

In[ ]:=
```
FullSimplify[%]
```

Out[ ]= 0

In[ ]:=
```
yvergelijking1 = %
```

Out[ ]= 0

In[ ]:=

The electromagnetic force density in the z - direction equals :

In[ ]:=
```
zvergelijking = term1⟦3⟧ + term2⟦3⟧ + term3⟦3⟧ + term4⟦3⟧ +
  term5⟦3⟧ + term6⟦3⟧
```

Out[ ]=
$$-e^{-G1\, z\, \epsilon0\, \mu0}\, G1\, \epsilon0^2\, \mu0\, g\left[e^{-G1\, \epsilon0\, \mu0}\left(t - z\sqrt{\epsilon0}\sqrt{\mu0}\right)\right]^2 - 2\, e^{-G1\, \epsilon0\, \mu0 - G1\, z\, \epsilon0\, \mu0}\, \epsilon0^{3/2}\sqrt{\mu0}\, g\left[e^{-G1} \right.$$
$$\mu0\left(-\frac{1}{2}\, e^{-G1\, z\, \epsilon0\, \mu0}\, G1\, \epsilon0^2\, g\left[e^{-G1\, \epsilon0\, \mu0}\left(t - z\sqrt{\epsilon0}\sqrt{\mu0}\right)\right]^2 - \frac{e^{-G1\, \epsilon0\, \mu0 - G1\, z\, \epsilon0\, \mu0}\, \epsilon0^{3/2}\, g\left[e^{-G1\, \epsilon} \right.}{\quad}\right.$$
$$\epsilon0\left(-\frac{1}{2}\, e^{-G1\, z\, \epsilon0\, \mu0}\, G1\, \epsilon0\, \mu0\, g\left[e^{-G1\, \epsilon0\, \mu0}\left(t - z\sqrt{\epsilon0}\sqrt{\mu0}\right)\right]^2 - e^{-G1\, \epsilon0\, \mu0 - G1\, z\, \epsilon0\, \mu0}\sqrt{\epsilon0}\sqrt{\mu0}\, g\right.$$

In[ ]:= FullSimplify[%]

Out[ ]= 0

In[ ]:= zvergelijking1 = %

Out[ ]= 0

Results force densities in resp x-direction, y-direction, z-direction

Results for the electromagentic force densities in resp x-direction, y-direction, z-direction:

In[ ]:= xvergelijking1

Out[ ]= 0

In[ ]:= yvergelijking1

Out[ ]= 0

In[ ]:= zvergelijking1

Out[ ]= 0

According the force-density equations in the x-direction, y-
equals zero in every direction. This represents the solution for
It follows from the mathematical solution for the electromagne

$$ev = e^{-\frac{1}{2} G1\, z\, \epsilon0\, \mu0}\, g\left[e^{-G1\, \epsilon0\, \mu0}\left(t - z\sqrt{\epsilon0}\sqrt{\mu0}\right)\right]$$

that the intensity increases with the value:

$$\text{Intensity} = -\frac{1}{2}\left(\epsilon0\,(\text{Dot}[ev, ev]) + \mu0\,(\text{Dot}[mv, mv])\right)$$

$$-\frac{1\left(e^{-\frac{G1\, z\, \epsilon0\, \mu0}{2}}\, \epsilon0\, g\left[e^{-G1\, \epsilon0\, \mu0}\left(t - z\sqrt{\epsilon0}\sqrt{\mu0}\right)\right]^2 + e^{-\frac{G1\, z\, \epsilon0\, \mu0}{2}}\, g\left[e^{-G1\, \epsilon0\, \mu0}\left(t - z\sqrt{\epsilon0}\sqrt{\mu0}\right)\right]^2 \epsilon0\right)}{2}$$

The Electromagnetic Energy Intenstity is proportional to: $e^{-G1\, z\, \epsilon0\, \mu0}$
distance z in the direction opposite to the z-direction of the gra
The frequency is proportional to the energy density (book: Equatio
energy. The speed of light remains constant in a gravitational f

Within a Constant Gravitational Field G1 The observed Cosmo

$$\omega_{\text{NLGR}} = \omega_0 \, e^{-g z \mu_0 \varepsilon_0} \sqrt{\frac{1 + \frac{v}{c}}{1 - \frac{v}{c}}}$$

The term $\left(\frac{\Delta \omega}{\omega} = e^{-g z \mu_0 \varepsilon_0}\right)$

in Quantum Light Theory (QLT) differs

from the second term $\frac{1}{2!}\left(- g z \mu_0 \varepsilon_0\right)^2$ in Taylors Series of the exp

the Classical Gravitational Frequency Shift:

$\left(\frac{\Delta \omega}{\omega} = - g z \mu_0 \varepsilon_0\right)$ in General Relativity presented in

An improved approach for testing Gravitational Redshift via Satellite-Base three frequency links combination

Example 3

Propagation of a Beam of Light in the radial-direction of the Sun from the Gravitational Radius of the sun unti with the speed of light $c = \frac{1}{\sqrt{\epsilon 0 \, \mu 0}}$ within a Radial Gravitational Field G1 oriented in the r resulting in Gravitational Redshift $v_{\text{Grav}-1}$ (GRS) caused

There are **two** kinds of Redshift caused by the gravitational field of the

1) Redshift_1 caused by the Gravitational Field within the fusion core (created). This has been calculated in Example 3
2) Redshift_2 caused by the Gravitational Field outside the fusion core

The total RedShift caused by the Gravitational Field of the sun is the

Book : Rising of the James Webb Space Telescope and its Fundamental Bli

Example of a Spherical Beam of Light , propagating in the radial – directio

with the speed of light $c = \frac{1}{\sqrt{\epsilon 0 \, \mu 0}}$.

The input for the Electric Field Intensity {E (x, y, z) = ey } and the Magnetic Fie

The input for the Electric Field Intensity {E (x, y, z,) = cv } and the Magnetic Fi

for the Electromagnetic Field within a constant gravitational field with accelleratio

$$-\frac{1}{c^2}\frac{\partial(\bar{E}\times\bar{H})}{\partial t}+\varepsilon_0\,\bar{E}\,(\nabla.\bar{E})-\varepsilon_0\,\bar{E}\times(\nabla\times\bar{E})+\mu_0\,\bar{H}\,(\nabla.\bar{H})-\mu_0\,\bar{H}\times(\nabla\times\bar{H})+\frac{1}{2}\left(\varepsilon^2\,\mu\left(\bar{E}\right.\right.$$

Which can be written as :

$$\text{term1} = -\frac{1}{c^2}\frac{\partial(\bar{E}\times\bar{H})}{\partial t}$$

$$\text{term 2} = \varepsilon_0\,\bar{E}\,(\nabla.\bar{E})$$

$$\text{term3} = -\varepsilon_0\,\bar{E}\times(\nabla\times\bar{E})$$

$$\text{term4} = \mu_0\,\bar{H}\,(\nabla.\bar{H})$$

$$\text{term5} = -\mu_0\,\bar{H}\times(\nabla\times\bar{H})$$

$$\text{term6} = -\frac{1}{2}\left(\varepsilon^2\,\mu\left(\bar{E}\,.\,\bar{E}\right)+\varepsilon\,\mu^2\left(\bar{H}\,.\,\bar{H}\right)\right)\bar{g}$$

Equation (73) equals :

$$\text{term1} + \text{term2} + \text{term3} + \text{term4} + \text{term5} + \text{term6} = 0$$

In[ ]:= ϵ0 =.

In[ ]:= μ0 =.

In[ ]:= x =.

In[ ]:= y =.

In[ ]:= z =.

In[ ]:= t =.

In[ ]:= Get["VectorAnalysis`"]

— General : VectorAnalysis` is now obsolete. The legacy version being loaded may conflict wit

In[ ]:= Get["Calculus`DSolve`"]

— Get : Cannot open Calculus`DSolve`.

Out[ ]= $Failed

In[ ]:= InverseFunctions → True

Out[ ]= InverseFunctions → True

In[ ]:= Needs["DifferentialEquations`NDSolveProblems`"]

In[ ]:= Needs["DifferentialEquations`NDSolveUtilities`"]

In[ ]:= Needs["DifferentialEquations`InterpolatingFunctionAnatomy`"]

In[ ]:= Get["Calculus`DSolveIntegrals`"]

— Get : Cannot open Calculus`DSolveIntegrals`.

Out[ ]= $Failed

In[ ]:= SetCoordinates[Cartesian[x, y, z]]

Out[ ]= Cartesian[x, y, z]

In[ ]:= G1 = .

In[ ]:= ϵ0 = .

In[ ]:= μ0 =.

In[ ]:= fg = .

In[ ]:= Msun = .

[redacted]

The light being emitted by the sun has been created by nuclear fusion in the c

Outside the Gravitational Radius of the Sun, (the distance of the center of the sun where

the generated light will propagate with the speed of light :

$$c = \frac{1}{\sqrt{\epsilon0\,\mu0}}$$

oppositely directed towards the gravitational accelleration outside the sun. The gravitational accelleration outside the sun will increase proportiona

$$g2[r] = K2\,\frac{1}{r^2} = \frac{f_g\,M_{Sun}}{4\,\pi}\,\frac{1}{r^2}$$

within a Radial Gravitational Field g[r] oriented

in the radial – direction of the Sun with accelleration g[r] resulting in the

Gravitational Redshift caused by the Gravitational Field outside the Sun.

The Gravitational Intensity Shift for the light emitted by the sun equals

$$I_{NGR} = e^{-\frac{K2\,\epsilon0\,\mu0}{z}}$$

Instead of Spherical Coordinates (r, θ, φ) for the light emitted Spherically

for the far field (within a small area like the dimensions of a Space Telesco

Cartesian Coordinates (x, y, z) are being used.

In[ ]:= $\epsilon0 = .$

In[ ]:= $\mu0 =.$

In[ ]:= fg = .

In[•]:= Msun = .

In[•]:= K1 = .

In[•]:= K2 = .

In[•]:= $h[z] = K3\, e^{-\frac{K2\, \epsilon 0\, \mu 0}{2 z}}$

Out[•]= $e^{-\frac{K2\, \epsilon 0\, \mu 0}{2 z}}\, K3$

In[•]:= $ev = \{h[z] \times g[(t - z \sqrt{\epsilon 0}\ \sqrt{\mu 0})], 0, 0\}$

Out[•]= $\{e^{-\frac{K2\, \epsilon 0\, \mu 0}{2 z}}\, K3\, g[t - z \sqrt{\epsilon 0}\ \sqrt{\mu 0}], 0, 0\}$

In[•]:= mv = (1 / Sqrt[μ0]) * Sqrt[ϵ0] *
{0, h[z] × g[(t − z √ϵ0 √μ0)], 0}

Out[•]= $\left\{0, \frac{e^{-\frac{K2\, \epsilon 0\, \mu 0}{2 z}}\, K3 \sqrt{\epsilon 0}\ g[t - z \sqrt{\epsilon 0}\ \sqrt{\mu 0}]}{\sqrt{\mu 0}}, 0\right\}$

In[•]:= $g2 = \{0, 0, \frac{-K2}{z^2}\}$

Out[•]= $\{0, 0, -\frac{K2}{z^2}\}$

In[•]:= $Intensity = \frac{1}{2} (\epsilon 0\, (Dot[ev, ev]) + \mu 0\, (Dot[mv, mv]))$

Out[•]= $\frac{1 \left(e^{-\frac{K2\, \epsilon 0\, \mu 0}{z}}\, K3^2\, \epsilon 0\, g[t - z \sqrt{\epsilon 0}\ \sqrt{\mu 0}]^2 + e^{-\frac{K2\, \epsilon 0\, \mu 0}{z}}\, K3^2\, g[t - z \sqrt{\epsilon 0}\ \sqrt{\mu 0}]^2\, \epsilon 0\right)}{2}$

In[ ]:= FullSimplify[%]

Out[ ]= $\frac{e^{-\frac{K2\,\epsilon0\,\mu0}{z}}\,K3^2\,g\left[t-z\sqrt{\epsilon0}\sqrt{\mu0}\right]^2 1\left(\epsilon0+\epsilon0\right)}{2}$

In[ ]:= Div[ev]

Out[ ]= 0

In[ ]:= Div[mv]

Out[ ]= 0

In[ ]:= FullSimplify[%]

Out[ ]= 0

In[ ]:= term1a = D[Cross[ev, mv], t]

Out[ ]= $\left\{0,\ 0,\ \frac{2\,e^{-\frac{K2\,\epsilon0\,\mu0}{z}}\,K3^2\sqrt{\epsilon0}\,g\left[t-z\sqrt{\epsilon0}\sqrt{\mu0}\right]g'\left[t-z\sqrt{\epsilon0}\sqrt{\mu0}\right]}{\sqrt{\mu0}}\right\}$

$$\text{term1} = -\frac{1}{c^2}\frac{\partial(\bar{E}\times\bar{H})}{\partial t}$$

In[ ]:= term1 = ((−ϵ0) * μ0) * D[Cross[ev, mv], t]

Out[ ]= $\left\{0,\ 0,\ -2\,e^{-\frac{K2\,\epsilon0\,\mu0}{z}}\,K3^2\,\epsilon0^{3/2}\sqrt{\mu0}\,g\left[t-z\sqrt{\epsilon0}\sqrt{\mu0}\right]g'\left[t-z\sqrt{\epsilon0}\sqrt{\mu0}\right]\right\}$

$$\text{term2} = \varepsilon_0\,\bar{E}\,(\nabla\,.\,\bar{E})$$

In[ ]:= term2 = ϵ0 * ev * Div[ev]

Out[ ]= {0, 0, 0}

$$\text{term3} = -\varepsilon_0\,\bar{E}\times(\nabla\times\bar{E})$$

In[ ]:= term3 = (−ϵ0) ∗ Cross[ev, Curl[ev]]

$$\text{Out[ ]= } \left\{0,\ 0,\ -\epsilon 0 \left(\frac{e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\ K2\ K3^2\ \epsilon 0\ \mu 0\ g\left[t - z\sqrt{\epsilon 0}\ \sqrt{\mu 0}\right]^2}{2\ z^2} - e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\ K3^2\ \sqrt{\epsilon 0}\ \sqrt{\mu 0}\ g\left[t - z\sqrt{\cdot\right.\right.\right.$$

$$\text{term4} = \mu_0\, \overline{H}\, (\nabla . \overline{H})$$

In[ ]:= term4 = μ0 ∗ mv ∗ Div[mv]

Out[ ]= {0, 0, 0}

$$\text{term5} = -\mu_0\, \overline{H} \times (\nabla \times \overline{H})$$

In[ ]:= term5 = (−μ0) ∗ Cross[mv, Curl[mv]]

$$\text{Out[ ]= } \left\{0,\ 0,\ -\mu 0 \left(\frac{e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\ K2\ K3^2\ \epsilon 0^2\ g\left[t - z\sqrt{\epsilon 0}\ \sqrt{\mu 0}\right]^2}{2\ z^2} - \frac{e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\ K3^2\ \epsilon 0^{3/2}\ g\left[t - z\sqrt{\epsilon 0}\ \sqrt{\mu\cdots\right.}{\sqrt{\mu 0}}\right.\right.$$

$$\text{term6} = -\frac{1}{2}\left(\varepsilon^2\, \mu\left(\overline{E} . \overline{E}\right) + \varepsilon\, \mu^2\left(\overline{H} . \overline{H}\right)\right)\overline{g}$$

$$\text{In[ ]:= term6} = -\left(\frac{\epsilon 0^2\,\mu 0}{2}\ \text{Dot[ev, ev]} + \frac{\epsilon 0\,\mu 0^2}{2}\ \text{Dot[mv, mv]}\right)\text{g2}$$

$$\text{Out[ ]= } \left\{0,\ 0,\ \frac{e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\ K2\ K3^2\ \epsilon 0^2\ \mu 0\ g\left[t - z\sqrt{\epsilon 0}\ \sqrt{\mu 0}\right]^2}{z^2}\right\}$$

In[ ]:= vergelijking = term1 + term2 + term3 + term4 + term5 + term6

$$\text{Out[ ]= } \left\{0,\ 0,\ \frac{e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\ K2\ K3^2\ \epsilon 0^2\ \mu 0\ g\left[t - z\sqrt{\epsilon 0}\ \sqrt{\mu 0}\right]^2}{z^2} - 2\, e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\ K3^2\ \epsilon 0^{3/2}\ \sqrt{\mu 0}\ g\left[t - z\sqrt{\epsilon 0}\right.\right.$$

$$\mu 0\left(\frac{e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\ K2\ K3^2\ \epsilon 0^2\ g\left[t - z\sqrt{\epsilon 0}\ \sqrt{\mu 0}\right]^2}{2\ z^2} - \frac{e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\ K3^2\ \epsilon 0^{3/2}\ g\left[t - z\sqrt{\epsilon 0}\ \sqrt{\mu 0}\right]\ g'[\cdots}{\sqrt{\mu 0}}\right.$$

$$\epsilon 0\left(\frac{e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\ K2\ K3^2\ \epsilon 0\ \mu 0\ g\left[t - z\sqrt{\epsilon 0}\ \sqrt{\mu 0}\right]^2}{2\ z^2} - e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\ K3^2\ \sqrt{\epsilon 0}\ \sqrt{\mu 0}\ g\left[t - z\sqrt{\epsilon 0}\ \sqrt{\mu\cdots\right.\right.$$

In[ ]:=

The electromagnetic force density in the x - direction equals :

In[ ]:=
```
xvergelijking = term1[[1]] + term2[[1]] + term3[[1]] + term4[[1]] +
  term5[[1]] + term6[[1]]
```
Out[ ]= 0

In[ ]:=
```
FullSimplify[%]
```
Out[ ]= 0

In[ ]:=
```
xvergelijking1 = %
```
Out[ ]= 0

In[ ]:=

The electromagnetic force density in the y - direction equals :

In[ ]:=
```
yvergelijking = term1[[2]] + term2[[2]] + term3[[2]] + term4[[2]] +
  term5[[2]] + term6[[2]]
```
Out[ ]= 0

In[ ]:=
```
FullSimplify[%]
```
Out[ ]= 0

In[ ]:=
```
yvergelijking1 = %
```
Out[ ]= 0

The electromagnetic force density in the z - direction equals :

In[ ]:= zvergelijking = term1[[3]] + term2[[3]] + term3[[3]] + term4[[3]] + term5[[3]] + term6[[3]]

Out[ ]= $\frac{e^{-\frac{K2\,\epsilon0\,\mu0}{z}}\,K2\,K3^2\,\epsilon0^2\,\mu0\,g\left[t-z\sqrt{\epsilon0}\sqrt{\mu0}\right]^2}{z^2} - 2\,e^{-\frac{K2\,\epsilon0\,\mu0}{z}}\,K3^2\,\epsilon0^{3/2}\sqrt{\mu0}\,g\left[t-z\sqrt{\epsilon0}\sqrt{\mu0}\right]$ g

$\mu0\left(\frac{e^{-\frac{K2\,\epsilon0\,\mu0}{z}}\,K2\,K3^2\,\epsilon0^2\,g\left[t-z\sqrt{\epsilon0}\sqrt{\mu0}\right]^2}{2\,z^2} - \frac{e^{-\frac{K2\,\epsilon0\,\mu0}{z}}\,K3^2\,\epsilon0^{3/2}\,g\left[t-z\sqrt{\epsilon0}\sqrt{\mu0}\right]\,g'[t}{\sqrt{\mu0}}\right.$

$\epsilon0\left(\frac{e^{-\frac{K2\,\epsilon0\,\mu0}{z}}\,K2\,K3^2\,\epsilon0\,\mu0\,g\left[t-z\sqrt{\epsilon0}\sqrt{\mu0}\right]^2}{2\,z^2} - e^{-\frac{K2\,\epsilon0\,\mu0}{z}}\,K3^2\sqrt{\epsilon0}\sqrt{\mu0}\,g\left[t-z\sqrt{\epsilon0}\sqrt{\mu0}\right.\right.$

In[ ]:= FullSimplify[%]

Out[ ]= 0

In[ ]:= zvergelijking1 = %

Out[ ]= 0

Results for the electromagentic force densities in resp x-direction, y-direction, z-direction:

In[ ]:= xvergelijking1

Out[ ]= 0

In[ ]:= yvergelijking1

Out[ ]= 0

In[ ]:= zvergelijking1

Out[ ]= 0

According the force-density equations in the x-direction, y-direction a
every direction. This represents the solution for equation (73) on page
It follows from the mathematical solution for the electromagnetic fiel

$$ev = e^{-\frac{K2\,\epsilon0\,\mu0}{z}}\,g\left[e^{-\frac{K2\,\epsilon0\,\mu0}{2z}}\left(t-z\sqrt{\epsilon0}\sqrt{\mu0}\right)\right]$$

that the intensity increases with the value:

$$\text{Intensity} = \frac{1}{2}(\epsilon 0\,(\text{Dot}[ev, ev]) + \mu 0\,(\text{Dot}[mv, mv])) =$$

$$= e^{-\frac{K2\ \epsilon 0\,\mu 0}{z}}\ \epsilon 0\ g\left[e^{-\frac{K2\ \epsilon 0\,\mu 0}{2z}}\left(t - z\sqrt{\epsilon 0}\ \sqrt{\mu 0}\right)\right]^2$$

The Electromagnetic Energy Intensity is proportional to: $e^{-\frac{K2\ \epsilon 0\,\mu 0}{z}}$ alo
distance z in the direction opposite to the z-direction of the gravitatio

The frequency is proportional to the energy density (book: Equation 98 Pag
The speed of light remains constant in a gravitational field.

Within a Gravitational Field $\frac{K2}{z^2}$ The observed Cosmological Redshif

$$\omega_{\text{NLGR}} = \omega_0\, e^{-\frac{K2\ \epsilon 0\,\mu 0}{z}} \sqrt{\frac{1 + \frac{v}{c}}{1 - \frac{v}{c}}}$$

The term $\left(\frac{\Delta\omega}{\omega} = e^{-\frac{K2\ \epsilon 0\,\mu 0}{z}}\right)$

has been presented in generally as a GRS Redshift comparable with th
generated by a velocity v_{Doppler} :

$$v_{\text{Doppler}} = c\,\frac{\Delta\omega}{\omega}\,[m\, s^{-1}] = c\, e^{-\frac{K2\ \epsilon 0\,\mu 0}{z}}$$

There are two types of GRS generated by the sun.

1) GRS generated inside the sun where the gravitational field is propo

g[z] = K1 z with the Solution:

$$v_{\text{Doppler}-1} = c\,\frac{\Delta\omega}{\omega}\,[m\, s^{-1}] = c\, e^{-\frac{1}{4} K1\, z^2\, \mu_0\ \varepsilon_0}$$

(book, page 64, Equation (111))

2) GRS generated outside the sun where the gravitational field is prop
to the radial distance $\frac{1}{z^2}$
g[z] = K2 $\frac{1}{z^2}$ with the Solution:

$v_{\text{Doppler}-2} = c\, \frac{\Delta\,\omega}{\omega}\ [m\, s^{-1}] = c\, e^{-\frac{K2\ \epsilon0\,\mu0}{z}}$

(book, page 64, Equation (111))

In[ ]:= $\text{Intensity} = -\frac{1}{2}\left(\epsilon0\,(\text{Dot}[ev, ev]) + \mu0\,(\text{Dot}[mv, mv])\right)$

Out[ ]= $-\frac{1\left(e^{-\frac{K2\,\epsilon0\,\mu0}{z}}\, K3^2\, \epsilon0\, g\left[t - z\sqrt{\epsilon0}\sqrt{\mu0}\right]^2 + e^{-\frac{K2\,\epsilon0\,\mu0}{z}}\, K3^2\, g\left[t - z\sqrt{\epsilon0}\sqrt{\mu0}\right]^2 \epsilon0\right)}{2}$

In[ ]:= FullSimplify[%]

Out[ ]= $-\frac{e^{-\frac{K2\,\epsilon0\,\mu0}{z}}\, K3^2\, g\left[t - z\sqrt{\epsilon0}\sqrt{\mu0}\right]^2\, 1\left(\epsilon0 + \epsilon0\right)}{2}$

2) GRS generated outside the sun where the gravitational field to the radial distance $\frac{1}{z^2}$

$g[z] = K2\,\frac{1}{z^2}$ with the Solution:

$v_{\text{Doppler}-2} = c\, \frac{\Delta\,\omega}{\omega}\ [m\, s^{-1}] = c\, e^{-\frac{K2\ \epsilon0\,\mu0}{z}}$

(book, page 64, Equation (111))

$v_{\text{Doppler}-1} = c\, \frac{\Delta\,\omega}{\omega}\ [m\, s^{-1}] = c\, e^{-\frac{K2\ \epsilon0\,\mu0}{z2}} - c\, e^{-\frac{K2\ \epsilon0\,\mu0}{z1}}$

With:

$z_1 =$ Radius of the sun

$z_2 =$ Distance between the sun and the Earth

In[ ]:= $c = 3\times 10^8$

Out[ ]= 300 000 000

In[ ]:= $\epsilon 0 = 8.85 \times 10^{-12}$

Out[ ]= 8.85×10^{-12}

In[ ]:= $\mu 0 = 4 \pi 10^{-7}$

Out[ ]= $\frac{\pi}{2\,500\,000}$

In[ ]:= $fg = 6.67428 \times 10^{-11}$

Out[ ]= 6.67428×10^{-11}

In[ ]:= $K2 = \frac{fg\, Msun}{4 \pi}$

Out[ ]= 1.05612×10^{19}

$Msun = 1.98892\ 10^{30}$

Out[ ]= 1.98847×10^{30}

In[ ]:= $R_{Sun} = 69\,634\,000$

Out[ ]= 69 634 000

The energy from the Sun, both heat and light energy,
originates from *a* nuclear fusion process that is occurring inside the cor
type of fusion that occurs inside of the Sun is known as proton − pro

Inside the Sun, this process begins with protons (which is simply *a*
these protons fuse together and are turned into helium. This fusion proc
and the transformation results in *a* release of energy that keeps the sun
moves across the solar system. It is important to note that the core is t
of heat through fusion (it contributes about 99 × %). The rest of the S

The sun looks like *a* featureless yellow orb from Earth,
but it has discrete internal layers. The central core, which is the only pla
happens, extends to *a* radius of 138 000 kilometers. Beyond that, the r

and the convective zone reaches to the photosphere.At *a* radius of 695 (
the photosphere is the deepest layer that astronomers can observe direc
and is the closest the sun has to *a* surface. The most intense part of the e
takes place at about 1 / 3 of the the radius (138 000 kilometers) of th

z1 = 55 000 000

This is the area where the emitted spectra of the sun has been detected b

Out[●]=
69634000

In[●]:= z1 = 55 000 000

Out[●]= 55 000 000

The distance between Sun and Earth equals z2

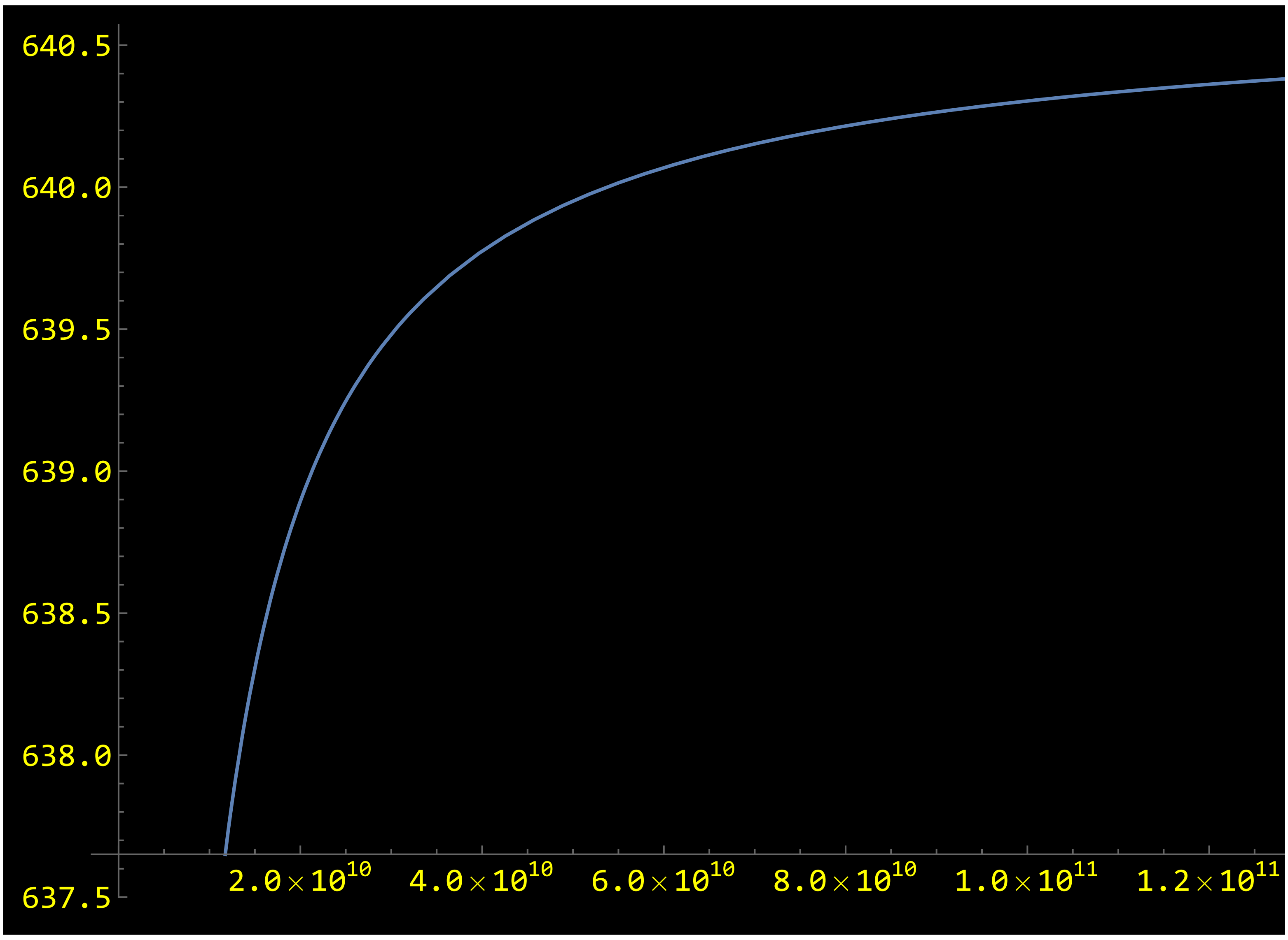
In[●]:= z2 = 149 597 870 700

Out[●]= 149 597 870 700

The Gravitational Doppler Shift from the emitting area of the fusion core of
presented below :

In[ ]:= $\text{Plot}\left[c\left(e^{-\frac{K2\ \epsilon0\ \mu0}{z}} - e^{-\frac{K2\ \epsilon0\ \mu0}{z1}}\right), \{z, z1, z2\}\right]$

Out[ ]=



$$v_{\text{Doppler}} = c\left(e^{-\frac{K2\ \epsilon0\ \mu0}{z2}} - e^{-\frac{K2\ \epsilon0\ \mu0}{z1}}\right)$$

Out[ ]= 640.42

In[ ]:=

The calculated value of 640.4 [m / s] for the GRS of the Sun corresponds to the measured average value for the GRS of t
published in :

The solar gravitational redshift from HARPS – LFC
Moon spectra. (A test of the general theory of relativity)

Example 4

Deviations in the measured values for the GRS of the Sun originating from the Gravitational Field of the Sun with

Book : Rising of the James Webb Space Telescope and its Fundamental Bli

Example of a Spherical Beam of Light , propagating in the radial – directio

with the speed of light $c = \frac{1}{\sqrt{\epsilon0\ \mu0}}$.

The input for the Electric Field Intensity {E (x, y, z) = ey } and the Magnetic Fie for the Electromagnetic Field within a constant gravitational field with accelleratio

$$-\frac{1}{c^2}\frac{\partial(\bar{E}\times\bar{H})}{\partial t}+\varepsilon_0\,\bar{E}\,(\nabla.\bar{E})-\varepsilon_0\,\bar{E}\times(\nabla\times\bar{E})+\mu_0\,\bar{H}\,(\nabla.\bar{H})-\mu_0\,\bar{H}\times(\nabla\times\bar{H})+\frac{1}{2}\Big(\varepsilon^2\,\mu\Big(\bar{E}$$

Which can be written as :

$$term1 \;=\; -\frac{1}{c^2}\frac{\partial(\bar{E}\times\bar{H})}{\partial t}$$

$$term\,2 \;=\; \varepsilon_0\,\bar{E}\,(\nabla.\bar{E})$$

$$term3 \;=\; -\varepsilon_0\,\bar{E}\times(\nabla\times\bar{E})$$

$$term4 \;=\; \mu_0\,\bar{H}\,(\nabla.\bar{H})$$

$$term5 \;=\; -\mu_0\,\bar{H}\times(\nabla\times\bar{H})$$

$$term6 \;=\; -\frac{1}{2}\left(\varepsilon^2\,\mu\left(\bar{E}\,.\,\bar{E}\right)+\varepsilon\,\mu^2\left(\bar{H}\,.\,\bar{H}\right)\right)\bar{g}$$

Equation (73) equals :

$$term1 + term2 + term3 + term4 + term5 + term6 = 0$$

In[ ]:=

```
ϵ0 =.
```

In[ ]:=
```
μ0 =.
```

In[ ]:=
```
x =.
```

In[ ]:=
```
y =.
```

In[ ]:=
```
z =.
```

In[ ]:=
```
t =.
```

In[ ]:=
```
Get["VectorAnalysis`"]
```

— General : VectorAnalysis` is now obsolete. The legacy version being loaded may conflict wit

In[ ]:=
```
Get["Calculus`DSolve`"]
```

— Get : Cannot open Calculus`DSolve`.

Out[ ]= $Failed

In[ ]:=
```
InverseFunctions → True
```

Out[ ]= InverseFunctions → True

In[ ]:=
```
Needs["DifferentialEquations`NDSolveProblems`"]
```

In[ ]:=
```
Needs["DifferentialEquations`NDSolveUtilities`"]
```

In[ ]:=
```
Needs["DifferentialEquations`InterpolatingFunctionAnatomy`"]
```

In[ ]:=
```
Get["Calculus`DSolveIntegrals`"]
```

— Get : Cannot open Calculus`DSolveIntegrals`.

Out[ ]= $Failed

In[ ]:=
```
SetCoordinates[Cartesian[x, y, z]]
```

Out[ ]=
```
Cartesian[x, y, z]
```

In[ ]:=
```
G1 = .
```

In[ ]:=
```
ϵ0 = .
```

In[ ]:=
```
μ0 =.
```

In[ ]:=
```
fg = .
```

In[ ]:=
```
Msun = .
```

The energy from the Sun - both heat and light energy - originates fron
specific type of fusion that occurs inside of the Sun is known as proto
simply a lone hydrogen nucleus) and through a series of steps, these p
occurs inside the core of the Sun, and the transformation results in a r
out from the Core of the Sun and moves across the solar system.[3] It
any significant amount of heat through fusion (it contributes about 99
core.

It is not clear from which part of the sun the GRS spectra has been me
emitted from the exact center of the sun (z1 = 0) until the part of the c

The energy from the Sun, both heat and light energy,
originates from *a* nuclear fusion process that is occurring inside the cor
type of fusion that occurs inside of the Sun is known as proton – pro

Inside the Sun, this process begins with protons (which is simply *a*
these protons fuse together and are turned into helium. This fusion proc
and the transformation results in *a* release of energy that keeps the sun
moves across the solar system. It is important to note that the core is t
of heat through fusion (it contributes about 99 × %). The rest of the S

The sun looks like *a* featureless yellow orb from Earth,

but it has discrete internal layers.The central core, which is the only pla
happens, extends to a radius of 138 000 kilometers. Beyond that, the r
and the convective zone reaches to the photosphere.At a radius of 695 (
the photosphere is the deepest layer that astronomers can observe direc

Inside the Gravitational Radius of the Sun

(the distance of the center of the sun where the gravitational accelleration of the sun changes from increasing into decreasin

$$c = \frac{1}{\sqrt{\epsilon 0\, \mu 0}}$$

oppositely directed towards the gravitational accelleration within the sun. The gravitational accelleration within the fusion core of the sun will in with the distance r.

$$g_1[r] = K1\, r = f_g \frac{M_{Sun}}{4\,\pi\,(Radius_{-Sun})^3}\, r$$

within a Radial Gravitational Field g[r] oriented in the radial −direction of the Sun with accelleration $g_1[r]$ resulting in the Gravitational Redshift caused by the Gravitational Field within the fusion c

The Gravitational Intensity Shift for the light emitted by the sun equals

$$I_{NGR} = e^{-\frac{1}{2} K1\, \epsilon 0\, \mu 0\, z^2}$$

Instead of Spherical Coordinates (r, θ, φ) for the light emitted Spherically for the far field (within a small area like the dimensions of a Space Telesco Cartesian Coordinates (x, y, z) are being used.

In[ ]:= ϵ0 = .

In[ ]:= μ0 =.

In[ ]:= fg = .

In[ ]:= Msun = .

In[ ]:= K1 = .

In[ ]:= K2 = .

In[ ]:= $h[z] = K2\, e^{-\frac{1}{4} K1\, z^2\, \epsilon 0\, \mu 0}$

Out[ ]= $e^{-\frac{1}{4} K1\, z^2\, \epsilon 0\, \mu 0}\, K2$

In[ ]:= $ev = \{h[z] \times g[(t - z \sqrt{\epsilon 0}\, \sqrt{\mu 0})], 0, 0\}$

Out[ ]= $\{e^{-\frac{1}{4} K1\, z^2\, \epsilon 0\, \mu 0}\, K2\, g[t - z \sqrt{\epsilon 0}\, \sqrt{\mu 0}], 0, 0\}$

In[ ]:= $mv = (1 / Sqrt[\mu 0]) * Sqrt[\epsilon 0] * \{0, h[z] \times g[(t - z \sqrt{\epsilon 0}\, \sqrt{\mu 0})], 0\}$

Out[ ]= $\left\{0, \frac{e^{-\frac{1}{4} K1\, z^2\, \epsilon 0\, \mu 0}\, K2 \sqrt{\epsilon 0}\, g[t - z \sqrt{\epsilon 0}\, \sqrt{\mu 0}]}{\sqrt{\mu 0}}, 0\right\}$

In[ ]:= gv = {0, 0, K1 z}

Out[ ]= {0, 0, K1 z}

In[ ]:= $Intensity = -\frac{1}{2} (\epsilon 0\, (Dot[ev, ev]) + \mu 0\, (Dot[mv, mv]))$

Out[ ]= $-\frac{1 \left(e^{-\frac{1}{2} K1\, z^2\, \epsilon 0\, \mu 0}\, K2^2\, \epsilon 0\, g[t - z \sqrt{\epsilon 0}\, \sqrt{\mu 0}]^2 + e^{-\frac{1}{2} K1\, z^2\, \epsilon 0\, \mu 0}\, K2^2\, g[t - z \sqrt{\epsilon 0}\, \sqrt{\mu 0}]^2\, \epsilon 0\right)}{2}$

In[ ]:= FullSimplify[%]

Out[ ]= $-\frac{e^{-\frac{1}{2} K1\, z^2\, \epsilon0\, \mu0}\, K2^2\, g\left[t - z\sqrt{\epsilon0}\sqrt{\mu0}\right]^2\, 1\, (\epsilon0 + \epsilon0)}{2}$

In[ ]:= Div[ev]

Out[ ]= 0

In[ ]:= Div[mv]

Out[ ]= 0

In[ ]:= FullSimplify[%]

Out[ ]= 0

In[ ]:= term1a = D[Cross[ev, mv], t]

Out[ ]= $\left\{0, 0, \frac{2\, e^{-\frac{1}{2} K1\, z^2\, \epsilon0\, \mu0}\, K2^2 \sqrt{\epsilon0}\, g\left[t - z\sqrt{\epsilon0}\sqrt{\mu0}\right] g'\left[t - z\sqrt{\epsilon0}\sqrt{\mu0}\right]}{\sqrt{\mu0}}\right\}$

In[ ]:=

$$\text{term1} = -\frac{1}{c^2}\frac{\partial(\overline{E}\times\overline{H})}{\partial t}.$$

In[ ]:= term1 = ((−ϵ0) ∗ μ0) ∗ D[Cross[ev, mv], t]

Out[ ]= $\left\{0, 0, -2\, e^{-\frac{1}{2} K1\, z^2\, \epsilon0\, \mu0}\, K2^2\, \epsilon0^{3/2} \sqrt{\mu0}\, g\left[t - z\sqrt{\epsilon0}\sqrt{\mu0}\right] g'\left[t - z\sqrt{\epsilon0}\sqrt{\mu0}\right]\right\}$

In[ ]:=

$$\text{term2} = \varepsilon_0\, \overline{E}\, (\nabla . \overline{E}).$$

In[ ]:= term2 = ϵ0 ∗ ev ∗ Div[ev]

Out[ ]= {0, 0, 0}

In[ ]:=

$$\text{term3} = -\varepsilon_0 \bar{E} \times (\nabla \times \bar{E}) .$$

In[ ]:= term3 = (−ϵ0) * Cross[ev, Curl[ev]]

Out[ ]= $\left\{0, 0, -\epsilon 0 \left(-\frac{1}{2} e^{-\frac{1}{2} K1\, z^2\, \epsilon 0\, \mu 0} K1\, K2^2\, z\, \epsilon 0\, \mu 0\, g\left[t - z\sqrt{\epsilon 0}\sqrt{\mu 0}\right]^2 - e^{-\frac{1}{2} K1\, z^2\, \epsilon 0\, \mu 0} K2^2 \sqrt{\epsilon 0}\sqrt{\mu}\right.\right.$

In[ ]:=

$$\text{term4} = \mu_0 \bar{H} (\nabla . \bar{H}) .$$

In[ ]:= term4 = μ0 * mv * Div[mv]

Out[ ]= {0, 0, 0}

In[ ]:=

$$\text{term5} = -\mu_0 \bar{H} \times (\nabla \times \bar{H}) .$$

In[ ]:= term5 = (−μ0) * Cross[mv, Curl[mv]]

Out[ ]= $\left\{0, 0, -\mu 0 \left(-\frac{1}{2} e^{-\frac{1}{2} K1\, z^2\, \epsilon 0\, \mu 0} K1\, K2^2\, z\, \epsilon 0^2\, g\left[t - z\sqrt{\epsilon 0}\sqrt{\mu 0}\right]^2 - \frac{e^{-\frac{1}{2} K1\, z^2\, \epsilon 0\, \mu 0} K2^2\, \epsilon 0^{3/2}\, g[t}{}\right.\right.$

In[ ]:=

$$\text{term6} = -\frac{1}{2}\left(\varepsilon^2 \mu \left(\bar{E} . \bar{E}\right) + \varepsilon\ \mu^2 \left(\bar{H} . \bar{H}\right)\right) \bar{g} .$$

In[ ]:= term6 = $-\left(\frac{\epsilon 0^2\, \mu 0}{2}\text{Dot[ev, ev]} + \frac{\epsilon 0\, \mu 0^2}{2}\text{Dot[mv, mv]}\right)$ gv

Out[ ]= $\left\{0, 0, -e^{-\frac{1}{2} K1\, z^2\, \epsilon 0\, \mu 0} K1\, K2^2\, z\, \epsilon 0^2\, \mu 0\, g\left[t - z\sqrt{\epsilon 0}\sqrt{\mu 0}\right]^2\right\}$

In[ ]:=
```
vergelijking = term1 + term2 + term3 + term4 + term5 + term6
```

Out[ ]=
$$\Big\{0,\ 0,\ -e^{-\frac{1}{2}\,K1\,z^2\,\epsilon0\,\mu0}\,K1\,K2^2\,z\,\epsilon0^2\,\mu0\,g\left[t-z\,\sqrt{\epsilon0}\,\sqrt{\mu0}\right]^2-2\,e^{-\frac{1}{2}\,K1\,z^2\,\epsilon0\,\mu0}\,K2^2\,\epsilon0^{3/2}\,\sqrt{\mu0}\,g\Big[$$
$$\mu0\left(-\frac{1}{2}\,e^{-\frac{1}{2}\,K1\,z^2\,\epsilon0\,\mu0}\,K1\,K2^2\,z\,\epsilon0^2\,g\left[t-z\,\sqrt{\epsilon0}\,\sqrt{\mu0}\right]^2-\frac{e^{-\frac{1}{2}\,K1\,z^2\,\epsilon0\,\mu0}\,K2^2\,\epsilon0^{3/2}\,g\left[t-z\,\sqrt{\epsilon}\right.}{\sqrt{\mu0}}\right.$$
$$\epsilon0\left(-\frac{1}{2}\,e^{-\frac{1}{2}\,K1\,z^2\,\epsilon0\,\mu0}\,K1\,K2^2\,z\,\epsilon0\,\mu0\,g\left[t-z\,\sqrt{\epsilon0}\,\sqrt{\mu0}\right]^2-e^{-\frac{1}{2}\,K1\,z^2\,\epsilon0\,\mu0}\,K2^2\,\sqrt{\epsilon0}\,\sqrt{\mu0}\,g\left[t\right.\right.$$

In[ ]:=

The electromagnetic force density in the x - direction equals :

In[ ]:=
```
xvergelijking = term1[[1]] + term2[[1]] + term3[[1]] + term4[[1]] +
  term5[[1]] + term6[[1]]
```

Out[ ]= 0

In[ ]:=
```
FullSimplify[%]
```

Out[ ]= 0

In[ ]:=
```
xvergelijking1 = %
```

Out[ ]= 0

In[ ]:=

The electromagnetic force density in the y - direction equals :

In[ ]:=
```
yvergelijking = term1[[2]] + term2[[2]] + term3[[2]] + term4[[2]] +
  term5[[2]] + term6[[2]]
```

Out[ ]= 0

In[ ]:=
```
FullSimplify[%]
```

Out[ ]= 0

In[ ]:=
```
yvergelijking1 = %
```

Out[ ]= 0

In[ ]:=

The electromagnetic force density in the z - direction equals :

In[ ]:=
```
zvergelijking = term1⟦3⟧ + term2⟦3⟧ + term3⟦3⟧ + term4⟦3⟧ +
  term5⟦3⟧ + term6⟦3⟧
```

Out[ ]= $-e^{-\frac{1}{2} K1\, z^2\, \epsilon 0\, \mu 0}\, K1\, K2^2\, z\, \epsilon 0^2\, \mu 0\, g\left[t - z\sqrt{\epsilon 0}\, \sqrt{\mu 0}\right]^2 - 2\, e^{-\frac{1}{2} K1\, z^2\, \epsilon 0\, \mu 0}\, K2^2\, \epsilon 0^{3/2}\, \sqrt{\mu 0}\, g\left[t - z\, \sqrt{\epsilon}\right.$

$\mu 0 \left(-\frac{1}{2}\, e^{-\frac{1}{2} K1\, z^2\, \epsilon 0\, \mu 0}\, K1\, K2^2\, z\, \epsilon 0^2\, g\left[t - z\sqrt{\epsilon 0}\, \sqrt{\mu 0}\right]^2 - \frac{e^{-\frac{1}{2} K1\, z^2\, \epsilon 0\, \mu 0}\, K2^2\, \epsilon 0^{3/2}\, g\left[t - z\, \sqrt{\epsilon 0}\right.}{\sqrt{\mu 0}}\right.$

$\epsilon 0 \left(-\frac{1}{2}\, e^{-\frac{1}{2} K1\, z^2\, \epsilon 0\, \mu 0}\, K1\, K2^2\, z\, \epsilon 0\, \mu 0\, g\left[t - z\sqrt{\epsilon 0}\, \sqrt{\mu 0}\right]^2 - e^{-\frac{1}{2} K1\, z^2\, \epsilon 0\, \mu 0}\, K2^2\, \sqrt{\epsilon 0}\, \sqrt{\mu 0}\, g\left[t -\right.\right.$

In[ ]:=
```
FullSimplify[%]
```

Out[ ]= 0

In[ ]:=
```
zvergelijking1 = %
```

Out[ ]= 0

Results force densities in resp x-direction, y-direction, z-direction

Results for the electromagentic force densities in resp x-direction, y-direction, z-direction:

In[ ]:=
```
xvergelijking1
```

Out[ ]= 0

In[ ]:=
```
yvergelijking1
```

Out[ ]= 0

In[ ]:=
```
zvergelijking1
```

Out[ ]= 0

According the force-density equations in the x-direction, y-
equals zero in every direction. This represents the solution for
It follows from the mathematical solution for the electromagne
that the intensity increases with the value:

$$\text{Intensity} = -\frac{1}{2}\left(\epsilon 0\,(\text{Dot}[\text{ev}, \text{ev}]) + \mu 0\,(\text{Dot}[\text{mv}, \text{mv}])\right)$$

$$-\frac{1\left(e^{-\frac{1}{4}\text{K1}\,z^2\,\epsilon 0\,\mu 0}\,\epsilon 0\,g\left[e^{-\frac{1}{2}\text{K1}\,z^2\,\epsilon 0\,\mu 0}\left(t - z\sqrt{\epsilon 0}\,\sqrt{\mu 0}\right)\right]^2 + e^{-\frac{1}{4}\text{K1}\,z^2\,\epsilon 0\,\mu 0}\,g\left[e^{-\frac{1}{2}\text{K1}\,z^2\,\epsilon 0\,\mu 0}\left(t - z\sqrt{\epsilon\right.\right.\right.}{2}$$

The Electromagnetic Energy Intensitity is proportional to: $e^{-\frac{1}{2}\text{K1}\,z^2\,\epsilon 0}$
distance z in the direction opposite to the z-direction of the gra

The frequency is proportional to the energy density (book: Equatio
energy. The speed of light remains constant in a gravitational f

Within a Constant Gravitational Field K1 z The observed Cosn

$$\omega_{\text{NLGR}} = \omega_0\, e^{-\frac{1}{2}\text{K1}\,z^2\,\epsilon 0\,\mu 0}\sqrt{\frac{1+\frac{v}{c}}{1-\frac{v}{c}}}$$

The term $\left(\frac{\Delta\omega}{\omega} = e^{-\frac{1}{2}\text{K1}\,z^2\,\epsilon 0\,\mu 0}\right)$

has been presented in generally as a GRS Redshift comparable
generated by a velocity v_{Doppler} :

$$v_{\text{Doppler}} = c\,\frac{\Delta\omega}{\omega}\,[\text{m}\,s^{-1}]$$

There are two types of GRS generated by the sun.

1) GRS generated inside the sun where the gravitational field is

g[z] = G1 z with the Solution:

$$v_{\text{Doppler}-1} = c\,\frac{\Delta\omega}{\omega}\,[\text{m}\,s^{-1}] = c\,e^{-\frac{1}{2}\text{G1}\,z^2\,\mu_0\,\varepsilon_0}$$

(book, page 64, Equation (111))

2) GRS generated outside the sun where the gravitational field
to the radial distance $\frac{1}{z^2}$ g[z] = G1 $\frac{1}{z^2}$ with the Solution:

$$v_{\text{Doppler}-2} = c\,\frac{\Delta\omega}{\omega}\,[\text{m}\,s^{-1}] = c\; = e^{-\,g\,z\,\mu_0\,\varepsilon_0}$$

(book, page 64, Equation (111))

In[ ]:= Intensity = $-\frac{1}{2}\left(\epsilon 0\ (\text{Dot[ev, ev]}) + \mu 0\ (\text{Dot[mv, mv]})\right)$

Out[ ]= $-\frac{1\left(e^{-\frac{1}{2}\text{K1}\, z^2\, \epsilon 0\, \mu 0}\, \text{K2}^2\, \epsilon 0\, g\left[t - z\sqrt{\epsilon 0}\sqrt{\mu 0}\right]^2 + e^{-\frac{1}{2}\text{K1}\, z^2\, \epsilon 0\, \mu 0}\, \text{K2}^2\, g\left[t - z\sqrt{\epsilon 0}\sqrt{\mu 0}\right]^2 \epsilon 0\right)}{2}$

In[ ]:= FullSimplify[%]

Out[ ]= $-\frac{e^{-\frac{1}{2}\text{K1}\, z^2\, \epsilon 0\, \mu 0}\, \text{K2}^2\, g\left[t - z\sqrt{\epsilon 0}\sqrt{\mu 0}\right]^2 1\left(\epsilon 0 + \epsilon 0\right)}{2}$

1) GRS generated inside the sun where the gravitational field is

g[z] = G1 z with the Solution:

$v_{\text{Doppler}-1} = c\,\frac{\Delta\omega}{\omega}\,[m\, s^{-1}] = c\, e^{-\frac{1}{2}\text{G1}\, z^2\, \mu_0\, \varepsilon_0}$

(book, page 64, Equation (111))

$v_{\text{Doppler}-1} = c\,\frac{\Delta\omega}{\omega}\,[m\, s^{-1}] = c\, e^{-\frac{1}{2}\text{G1}\, {z_2}^2\, \mu_0\, \varepsilon_0} - c\, e^{-\frac{1}{2}\text{G1}\, {z_1}^2\, \mu_0\, \varepsilon_0}$

With:

$z_1 =$ Center of the Fusion core within the sun (z1 = 0)

$z_2 =$ Radius of the sun ($z2 = 696\,340\ 10^{3}$)

In[ ]:= c = 3×10^8

Out[ ]= 300 000 000

In[ ]:= $\epsilon 0 = 8.85 \times 10^{-12}$

Out[ ]= 8.85×10^{-12}

In[•]:= $\mu 0 = 4\,\pi\,10^{-7}$

Out[•]= $\frac{\pi}{2\,500\,000}$

In[•]:= $fg = 6.67428 \times 10^{-11}$

Out[•]= 6.67428×10^{-11}

In[•]:= $Msun = 1.98847\ 10^{30}$

Out[•]= 1.98847×10^{30}

In[•]:= $Rsun = 696\,340\ 10^{3}$

Out[•]= $696\,340\,000$

In[•]:= $K1 = \frac{fg\ Msun}{4\,\pi\,Rsun^{3}}$

Out[•]= 3.12788×10^{-8}

In[•]:= $z1 = 0$

Out[•]= 0

In[•]:= $z2 = 696\,340\ 10^{3}$

Out[•]= $696\,340\,000$

In[•]:= $g[z] = \kappa 1\ z$

Out[•]= $3.12788 \times 10^{-8}\ z$

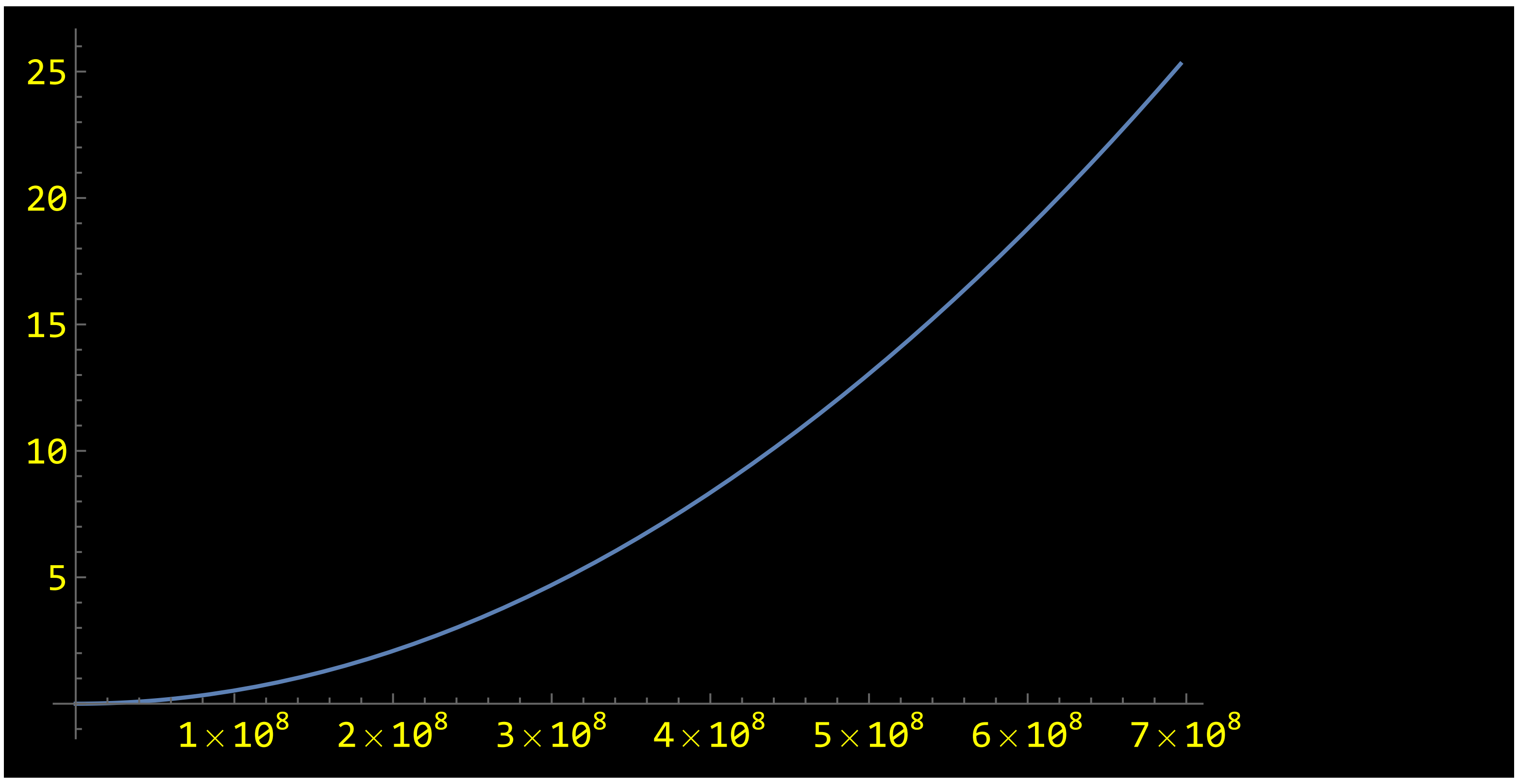
In[•]:= $g[z] = \kappa 1\ z$

Out[•]= $3.12788 \times 10^{-8}\ z$

The Gravitational Doppler Shift from the center of the sun until the Gravit

In[ ]:= $\text{Plot}\left[c\left(e^{-\frac{1}{2} K1\, z1^2 \mu0\, \epsilon0} - e^{-\frac{1}{2} K1\, z^2 \mu0\, \epsilon0}\right), \{z, 0, z2\}\right]$

Out[ ]=



In[ ]:= $v_{\text{Doppler}} = c\left(e^{-\frac{1}{2} K1\, z1^2 \mu0\, \epsilon0} - e^{-\frac{1}{2} K1\, z2^2 \mu0\, \epsilon0}\right)$

Out[ ]= 25.3009

The difference between the observed GRS of the light of the sun in the center of the sun (z1 = 0) until the radius of the sun (z2 = 696 340

Example 5

Propagation of a Beam of Light in the radial-direction of the Sirius from the Gravitational Radius of Sirius unt with the speed of light $c = \frac{1}{\sqrt{\epsilon0\, \mu0}}$ within a Radial Gravitational Field G1 oriented in the r resulting in Gravitational Redshift $v_{\text{Grav}-1}$ (GRS) caused

There are **two** kinds of Redshift caused by the gravitational field of the

1) Redshift_1 caused by the Gravitational Field within the fusion core created). This has been calculated in Example 3

2) Redshift_2 caused by the Gravitational Field outside the fusion core

The total RedShift caused by the Gravitational Field of the sun is the

Book : Rising of the James Webb Space Telescope and its Fundamental Bli

Example of a Spherical Beam of Light , propagating in the radial – directio

with the speed of light $c = \frac{1}{\sqrt{\epsilon 0\, \mu 0}}$.

The input for the Electric Field Intensity {E (x, y, z,) = ev } and the Magnetic Fie

for the Electromagnetic Field within a constant gravitational field with accelleratio

$$-\frac{1}{c^2}\frac{\partial(\bar{\mathbf{E}}\times\bar{\mathbf{H}})}{\partial t}+\varepsilon_0\,\bar{\mathbf{E}}\,(\nabla.\bar{\mathbf{E}})-\varepsilon_0\,\bar{\mathbf{E}}\times(\nabla\times\bar{\mathbf{E}})+\mu_0\,\bar{\mathbf{H}}\,(\nabla.\bar{\mathbf{H}})-\mu_0\,\bar{\mathbf{H}}\times(\nabla\times\bar{\mathbf{H}})+\frac{1}{2}\left(\varepsilon^2\,\mu\left(\bar{\mathbf{E}}\right.\right.$$

Which can be written as :

$$\text{term1} = -\frac{1}{c^2}\frac{\partial(\bar{E}\times\bar{H})}{\partial t}$$

$$\text{term 2} = \varepsilon_0\,\bar{E}\,(\nabla.\bar{E})$$

$$\text{term3} = -\varepsilon_0\,\bar{E}\times(\nabla\times\bar{E})$$

$$\text{term4} = \mu_0\,\bar{H}\,(\nabla.\bar{H})$$

$$\text{term5} = -\mu_0\,\bar{H}\times(\nabla\times\bar{H})$$

$$\text{term6} = -\frac{1}{2}\left(\varepsilon^2\,\mu\left(\bar{E}\,.\,\bar{E}\right)+\varepsilon\,\mu^2\left(\bar{H}\,.\,\bar{H}\right)\right)\bar{g}$$

Equation (73) equals :

term1 + term2 + term3 + term4 + term5 + term6 = 0

In[ ]:= ϵ0 =.

In[ ]:= μ0 =.

In[ ]:= x =.

In[ ]:= y =.

In[ ]:= z =.

In[ ]:= t =.

In[ ]:= Get["VectorAnalysis`"]

— General : VectorAnalysis` is now obsolete. The legacy version being loaded may conflict wit

In[ ]:= Get["Calculus`DSolve`"]

— Get : Cannot open Calculus`DSolve`.

Out[ ]= $Failed

In[ ]:= InverseFunctions → True

Out[ ]= InverseFunctions → True

In[ ]:= Needs["DifferentialEquations`NDSolveProblems`"]

In[ ]:= Needs["DifferentialEquations`NDSolveUtilities`"]

In[ ]:= Needs["DifferentialEquations`InterpolatingFunctionAnatomy`"]

In[ ]:= Get["Calculus`DSolveIntegrals`"]

— Get : Cannot open Calculus`DSolveIntegrals`.

Out[ ]= $Failed

In[ ]:= SetCoordinates[Cartesian[x, y, z]]

Out[ ]= Cartesian[x, y, z]

In[ ]:= G1 = .

In[ ]:= ϵ0 = .

In[ ]:= μ0 =.

In[ ]:= fg = .

In[ ]:= Msun = .

[redacted]

The light being emitted by the sun has been created by nuclear fusion in the c

Outside the Gravitational Radius of the Sun, (the distance of the center of the sun where

the generated light will propagate with the speed of light :

$$c = \frac{1}{\sqrt{\epsilon 0\, \mu 0}}$$

oppositely directed towards the gravitational accelleration outside the sun. The gravitational accelleration outside the sun will increase proportiona

$$g2[r] = K2 \frac{1}{r^2} = \frac{f_g M_{Sun}}{4\pi} \frac{1}{r^2}$$

within a Radial Gravitational Field g[r] oriented

in the radial – direction of the Sun with accelleration g[r] resulting in the

Gravitational Redshift caused by the Gravitational Field outside the Sun.

The Gravitational Intensity Shift for the light emitted by the sun equals

$$I_{NGR} = e^{-\frac{K2\, \epsilon 0\, \mu 0}{z}}$$

Instead of Spherical Coordinates (r, θ, φ) for the light emitted Spherically

for the far field (within a small area like the dimensions of a Space Telesco

Cartesian Coordinates (x, y, z) are being used.

In[ ]:= ϵ0 = .

In[ ]:= μ0 =.

In[ ]:= fg = .

In[•]:= Msun = .

In[•]:= K1 = .

In[•]:= K2 = .

In[•]:= $h[z] = K3\, e^{-\frac{K2\,\epsilon 0\,\mu 0}{2\,z}}$

Out[•]= $e^{-\frac{K2\,\epsilon 0\,\mu 0}{2\,z}}\, K3$

In[•]:= $ev = \{h[z] \times g[(t - z\sqrt{\epsilon 0}\ \sqrt{\mu 0})], 0, 0\}$

Out[•]= $\{e^{-\frac{K2\,\epsilon 0\,\mu 0}{2\,z}}\, K3\, g[t - z\sqrt{\epsilon 0}\ \sqrt{\mu 0}], 0, 0\}$

In[•]:= $mv = (1/\mathrm{Sqrt}[\mu 0]) * \mathrm{Sqrt}[\epsilon 0] * \{0, h[z] \times g[(t - z\sqrt{\epsilon 0}\ \sqrt{\mu 0})], 0\}$

Out[•]= $\left\{0, \frac{e^{-\frac{K2\,\epsilon 0\,\mu 0}{2\,z}}\, K3\,\sqrt{\epsilon 0}\, g[t - z\sqrt{\epsilon 0}\ \sqrt{\mu 0}]}{\sqrt{\mu 0}}, 0\right\}$

In[•]:= $g2 = \left\{0, 0, \frac{-K2}{z^2}\right\}$

Out[•]= $\left\{0, 0, -\frac{K2}{z^2}\right\}$

In[•]:= $Intensity = \frac{1}{2}(\epsilon 0\,(\mathrm{Dot}[ev, ev]) + \mu 0\,(\mathrm{Dot}[mv, mv]))$

Out[•]= $\frac{1\left(e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\, K3^2\,\epsilon 0\, g[t - z\sqrt{\epsilon 0}\ \sqrt{\mu 0}]^2 + e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\, K3^2\, g[t - z\sqrt{\epsilon 0}\ \sqrt{\mu 0}]^2\,\epsilon 0\right)}{2}$

In[ ]:= FullSimplify[%]

Out[ ]= $$\frac{e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\,K3^2\,g\left[t - z\,\sqrt{\epsilon 0}\,\sqrt{\mu 0}\right]^2\,1\,\left(\epsilon 0 + \epsilon 0\right)}{2}$$

In[ ]:= Div[ev]

Out[ ]= 0

In[ ]:= Div[mv]

Out[ ]= 0

In[ ]:= FullSimplify[%]

Out[ ]= 0

In[ ]:= term1a = D[Cross[ev, mv], t]

Out[ ]= $$\left\{0,\ 0,\ \frac{2\,e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\,K3^2\,\sqrt{\epsilon 0}\,g\left[t - z\,\sqrt{\epsilon 0}\,\sqrt{\mu 0}\right]\,g'\left[t - z\,\sqrt{\epsilon 0}\,\sqrt{\mu 0}\right]}{\sqrt{\mu 0}}\right\}$$

$$\text{term1} = -\frac{1}{c^2}\,\frac{\partial(\bar{E}\times\bar{H})}{\partial t}$$

In[ ]:= term1 = ((−ϵ0) * μ0) * D[Cross[ev, mv], t]

Out[ ]= $$\left\{0,\ 0,\ -2\,e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\,K3^2\,\epsilon 0^{3/2}\,\sqrt{\mu 0}\,g\left[t - z\,\sqrt{\epsilon 0}\,\sqrt{\mu 0}\right]\,g'\left[t - z\,\sqrt{\epsilon 0}\,\sqrt{\mu 0}\right]\right\}$$

$$\text{term2} = \varepsilon_0\,\bar{E}\,(\nabla\,.\,\bar{E})$$

In[ ]:= term2 = ϵ0 * ev * Div[ev]

Out[ ]= {0, 0, 0}

$$\text{term3} = -\varepsilon_0\,\bar{E}\times(\nabla\times\bar{E})$$

In[ ]:= term3 = (−ϵ0) ∗ Cross[ev, Curl[ev]]

Out[ ]= $\left\{0,\ 0,\ -\epsilon 0 \left(\frac{e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\ K2\ K3^2\ \epsilon 0\ \mu 0\ g\left[t - z\sqrt{\epsilon 0}\ \sqrt{\mu 0}\right]^2}{2\,z^2} - e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\ K3^2\ \sqrt{\epsilon 0}\ \sqrt{\mu 0}\ g\left[t - z\sqrt{\cdot}\right.\right.\right.$

$$term4 = \mu_0\, \overline{H}\, (\nabla . \overline{H})$$

In[ ]:= term4 = μ0 ∗ mv ∗ Div[mv]

Out[ ]= {0, 0, 0}

$$term5 = -\mu_0\, \overline{H} \times (\nabla \times \overline{H})$$

In[ ]:= term5 = (−μ0) ∗ Cross[mv, Curl[mv]]

Out[ ]= $\left\{0,\ 0,\ -\mu 0 \left(\frac{e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\ K2\ K3^2\ \epsilon 0^2\ g\left[t - z\sqrt{\epsilon 0}\ \sqrt{\mu 0}\right]^2}{2\,z^2} - \frac{e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\ K3^2\ \epsilon 0^{3/2}\ g\left[t - z\sqrt{\epsilon 0}\ \sqrt{\mu\cdot}\right.}{\sqrt{\mu 0}}\right.\right.$

$$term6 = -\frac{1}{2}\left(\varepsilon^2\,\mu\left(\overline{E}\,.\,\overline{E}\right) + \varepsilon\,\mu^2\left(\overline{H}\,.\,\overline{H}\right)\right)\overline{g}$$

In[ ]:= $term6 = -\left(\frac{\epsilon 0^2\,\mu 0}{2}\ Dot[ev, ev] + \frac{\epsilon 0\,\mu 0^2}{2}\ Dot[mv, mv]\right) g2$

Out[ ]= $\left\{0,\ 0,\ \frac{e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\ K2\ K3^2\ \epsilon 0^2\ \mu 0\ g\left[t - z\sqrt{\epsilon 0}\ \sqrt{\mu 0}\right]^2}{z^2}\right\}$

In[ ]:= vergelijking = term1 + term2 + term3 + term4 + term5 + term6

Out[ ]= $\left\{0,\ 0,\ \frac{e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\ K2\ K3^2\ \epsilon 0^2\ \mu 0\ g\left[t - z\sqrt{\epsilon 0}\ \sqrt{\mu 0}\right]^2}{z^2} - 2\,e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\ K3^2\ \epsilon 0^{3/2}\ \sqrt{\mu 0}\ g\left[t - z\sqrt{\epsilon 0}\right.\right.$

$\mu 0 \left(\frac{e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\ K2\ K3^2\ \epsilon 0^2\ g\left[t - z\sqrt{\epsilon 0}\ \sqrt{\mu 0}\right]^2}{2\,z^2} - \frac{e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\ K3^2\ \epsilon 0^{3/2}\ g\left[t - z\sqrt{\epsilon 0}\ \sqrt{\mu 0}\right]\ g'\left[\cdot\right.}{\sqrt{\mu 0}}\right.$

$\epsilon 0 \left(\frac{e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\ K2\ K3^2\ \epsilon 0\ \mu 0\ g\left[t - z\sqrt{\epsilon 0}\ \sqrt{\mu 0}\right]^2}{2\,z^2} - e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\ K3^2\ \sqrt{\epsilon 0}\ \sqrt{\mu 0}\ g\left[t - z\sqrt{\epsilon 0}\ \sqrt{\mu\cdot}\right.\right.$

In[ ]:=

The electromagnetic force density in the x - direction equals :

In[ ]:=
```
xvergelijking = term1⟦1⟧ + term2⟦1⟧ + term3⟦1⟧ + term4⟦1⟧ +
  term5⟦1⟧ + term6⟦1⟧
```
Out[ ]= 0

In[ ]:=
```
FullSimplify[%]
```
Out[ ]= 0

In[ ]:=
```
xvergelijking1 = %
```
Out[ ]= 0

In[ ]:=

The electromagnetic force density in the y - direction equals :

In[ ]:=
```
yvergelijking = term1⟦2⟧ + term2⟦2⟧ + term3⟦2⟧ + term4⟦2⟧ +
  term5⟦2⟧ + term6⟦2⟧
```
Out[ ]= 0

In[ ]:=
```
FullSimplify[%]
```
Out[ ]= 0

In[ ]:=
```
yvergelijking1 = %
```
Out[ ]= 0

The electromagnetic force density in the z - direction equals :

In[ ]:=
```
zvergelijking = term1[[3]] + term2[[3]] + term3[[3]] + term4[[3]] +
  term5[[3]] + term6[[3]]
```

Out[ ]=
$$\frac{e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\,K2\,K3^2\,\epsilon 0^2\,\mu 0\,g\left[t - z\,\sqrt{\epsilon 0}\,\sqrt{\mu 0}\,\right]^2}{z^2} - 2\,e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\,K3^2\,\epsilon 0^{3/2}\,\sqrt{\mu 0}\,g\left[t - z\,\sqrt{\epsilon 0}\,\sqrt{\mu 0}\,\right]\,g$$
$$\mu 0\left(\frac{e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\,K2\,K3^2\,\epsilon 0^2\,g\left[t - z\,\sqrt{\epsilon 0}\,\sqrt{\mu 0}\,\right]^2}{2\,z^2} - \frac{e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\,K3^2\,\epsilon 0^{3/2}\,g\left[t - z\,\sqrt{\epsilon 0}\,\sqrt{\mu 0}\,\right]\,g'\left[t\right.}{\sqrt{\mu 0}}\right.$$
$$\epsilon 0\left(\frac{e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\,K2\,K3^2\,\epsilon 0\,\mu 0\,g\left[t - z\,\sqrt{\epsilon 0}\,\sqrt{\mu 0}\,\right]^2}{2\,z^2} - e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\,K3^2\,\sqrt{\epsilon 0}\,\sqrt{\mu 0}\,g\left[t - z\,\sqrt{\epsilon 0}\,\sqrt{\mu 0}\right.\right.$$

In[ ]:=
```
FullSimplify[%]
```

Out[ ]= 0

In[ ]:=
```
zvergelijking1 = %
```

Out[ ]= 0

Results for the electromagentic force densities in resp x-direction, y-direction, z-direction:

In[ ]:=
```
xvergelijking1
```

Out[ ]= 0

In[ ]:=
```
yvergelijking1
```

Out[ ]= 0

In[ ]:=
```
zvergelijking1
```

Out[ ]= 0

According the force-density equations in the x-direction, y-direction a
every direction. This represents the solution for equation (73) on page
It follows from the mathematical solution for the electromagnetic fiel

$$ev = e^{-\frac{K2\,\epsilon 0\,\mu 0}{z}}\,g\left[e^{-\frac{K2\,\epsilon 0\,\mu 0}{2\,z}}\left(t - z\,\sqrt{\epsilon 0}\,\sqrt{\mu 0}\right)\right]$$

that the intensity increases with the value:

Intensity $= \frac{1}{2}(\epsilon 0\,(\text{Dot}[ev,\ ev]) + \mu 0\,(\text{Dot}[mv,\ mv])) =$

$$= e^{-\frac{K2\ \epsilon 0\,\mu 0}{z}}\ \epsilon 0\ g\left[e^{-\frac{K2\ \epsilon 0\,\mu 0}{2z}}\left(t - z\sqrt{\epsilon 0}\ \sqrt{\mu 0}\right)\right]^2$$

The Electromagnetic Energy Intensity is proportional to: $e^{-\frac{K2\ \epsilon 0\,\mu 0}{z}}$ alo
distance z in the direction opposite to the z-direction of the gravitatio

The frequency is proportional to the energy density (book: Equation 98 Pag
The speed of light remains constant in a gravitational field.

Within a Gravitational Field $\frac{K2}{z^2}$ The observed Cosmological Redshif

$$\omega_{\text{NLGR}} = \omega_0\, e^{-\frac{K2\ \epsilon 0\,\mu 0}{z}} \sqrt{\frac{1 + \frac{v}{c}}{1 - \frac{v}{c}}}$$

The term $\left(\frac{\Delta\,\omega}{\omega} = e^{-\frac{K2\ \epsilon 0\,\mu 0}{z}}\right)$

has been presented in generally as a GRS Redshift comparable with t
generated by a velocity v_{Doppler} :

$$v_{\text{Doppler}} = c\,\frac{\Delta\,\omega}{\omega}\ [m\ s^{-1}] = c\ e^{-\frac{K2\ \epsilon 0\,\mu 0}{z}}$$

There are two types of GRS generated by the sun.

1) GRS generated inside the sun where the gravitational field is propo

g[z] = K1 z with the Solution:

$$v_{\text{Doppler}-1} = c\,\frac{\Delta\,\omega}{\omega}\ [m\ s^{-1}] = c\ e^{-\frac{1}{4}K1\,z^2\,\mu_0\ \varepsilon_0}$$

(book, page 64, Equation (111))

2) GRS generated outside the sun where the gravitational field is prop
to the radial distance $\frac{1}{z^2}$

g[z] = K2 $\frac{1}{z^2}$ with the Solution:

$$v_{\text{Doppler}-2} = c\,\frac{\Delta\,\omega}{\omega}\,[\mathrm{m}\,s^{-1}] = c\,e^{-\frac{K2\,\epsilon0\,\mu0}{z}}$$

(book, page 64, Equation (111))

In[ ]:= Intensity $= -\frac{1}{2}\left(\epsilon0\,(\mathrm{Dot}[ev,\ ev]) + \mu0\,(\mathrm{Dot}[mv,\ mv])\right)$

Out[ ]= $-\frac{1\left(e^{-\frac{K2\,\epsilon0\,\mu0}{z}}\,K3^2\,\epsilon0\,g\left[t - z\,\sqrt{\epsilon0}\,\sqrt{\mu0}\,\right]^2 + e^{-\frac{K2\,\epsilon0\,\mu0}{z}}\,K3^2\,g\left[t - z\,\sqrt{\epsilon0}\,\sqrt{\mu0}\,\right]^2\,\epsilon0\right)}{2}$

In[ ]:= FullSimplify[%]

Out[ ]= $-\frac{e^{-\frac{K2\,\epsilon0\,\mu0}{z}}\,K3^2\,g\left[t - z\,\sqrt{\epsilon0}\,\sqrt{\mu0}\,\right]^2\,1\,(\epsilon0 + \epsilon0)}{2}$

2) GRS generated outside the sun where the gravitational field to the radial distance $\frac{1}{z^2}$

$g[z] = K2\,\frac{1}{z^2}$ with the Solution:

$$v_{\text{Doppler}-2} = c\,\frac{\Delta\,\omega}{\omega}\,[\mathrm{m}\,s^{-1}] = c\,e^{-\frac{K2\,\epsilon0\,\mu0}{z}}$$

(book, page 64, Equation (111))

$$v_{\text{Doppler}-1} = c\,\frac{\Delta\,\omega}{\omega}\,[\mathrm{m}\,s^{-1}] = c\,e^{-\frac{K2\,\epsilon0\,\mu0}{z2}} - c\,e^{-\frac{K2\,\epsilon0\,\mu0}{z1}}$$

With:

$z_1 =$ Radius of the sun

$z_2 =$ Distance between the sun and the Earth

In[ ]:= $c = 3\times10^8$

Out[ ]= 300 000 000

In[ ]:= $\epsilon0 = 8.85 \times 10^{-12}$

Out[ ]= 8.85×10^{-12}

In[ ]:= $\mu0 = 4\,\pi\,10^{-7}$

Out[ ]= $\frac{\pi}{2\,500\,000}$

In[ ]:= $fg = 6.67428 \times 10^{-11}$

Out[ ]= 6.67428×10^{-11}

In[ ]:= $Msun = 1.98892\ 10^{30}$

Out[ ]= 1.98892×10^{30}

In[ ]:= MSiriusB = 1.018 Msun

Out[ ]= 2.02472×10^{30}

In[ ]:= $R_{Sun} = 69\,634\,000$

Out[ ]= 69 634 000

In[ ]:= $R_{SiriusB} = 1.711\ R_{Sun}$

Out[ ]= 1.19144×10^{8}

In[ ]:= $Lightyear = 9.461 \times 10^{15}$

Out[ ]= 9.461×10^{15}

In[ ]:= z2 = 8.611 Lightyear

Out[ ]= 8.14687×10^{16}

In[ ]:= $K2 = \frac{fg\ MSiriusB}{4\pi}$

Out[ ]= 1.07537×10^{19}

In[ ]:= $z1 = 0.0063875\ R_{Sun}$

Out[ ]= 444 787.

The distance between Sirius and Earth equals z2

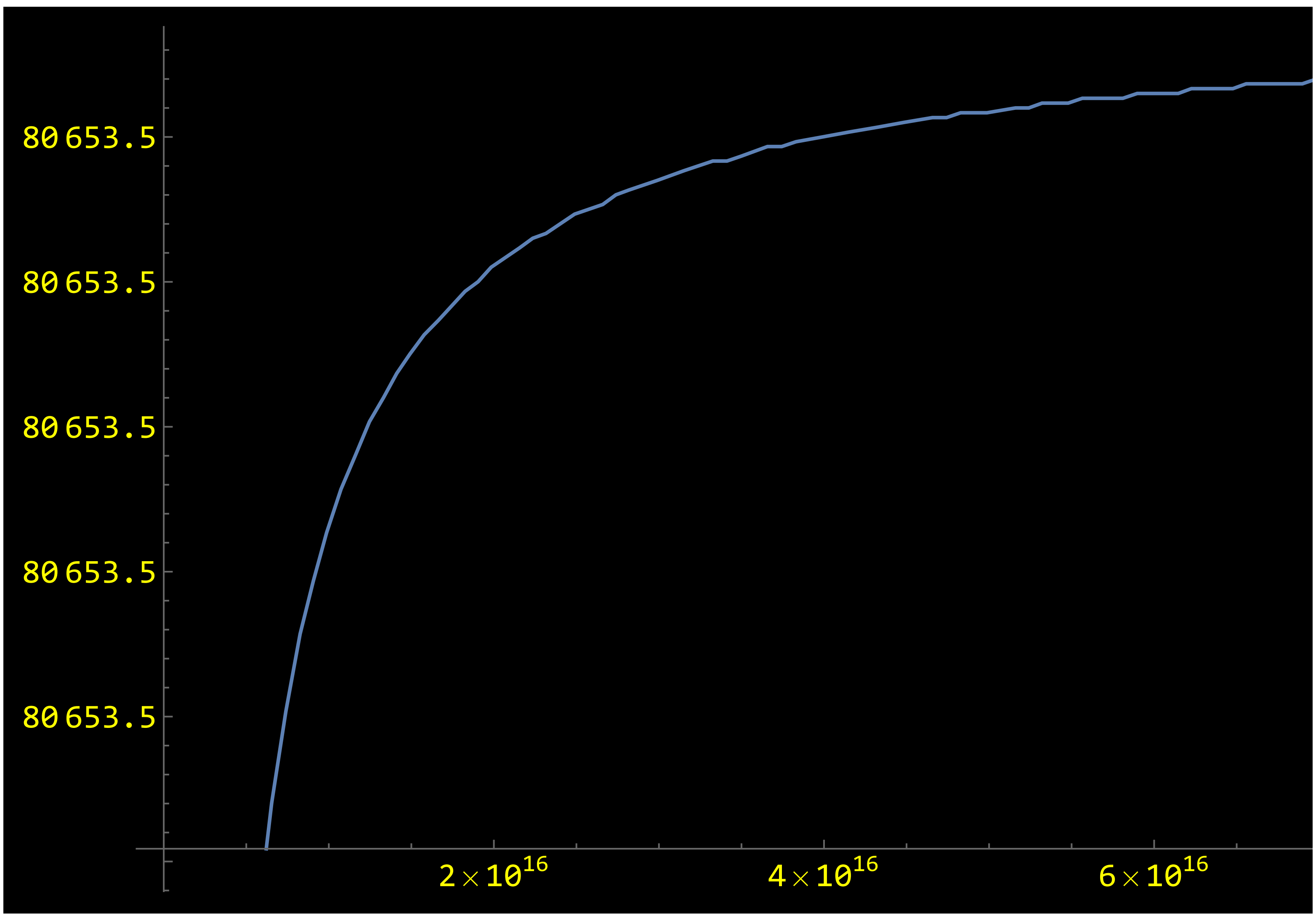
In[ ]:= z2 = 8.611 Lightyear

Out[ ]= 8.14669×10^{16}

The Gravitational RedShift from the “Intense Emitting Radiation Radius z

In[ ]:= $\text{Plot}\left[c\left(e^{-\frac{K2\ \epsilon0\ \mu0}{z}} - e^{-\frac{K2\ \epsilon0\ \mu0}{z1}}\right), \{z, z1, z2\}\right]$

Out[ ]=



In[ ]:= $v_{Doppler} = c\left(e^{-\frac{K2\ \epsilon0\ \mu0}{z2}} - e^{-\frac{K2\ \epsilon0\ \mu0}{z1}}\right)$

Out[ ]= 597.538

The calculated value of 80.65 k[m / s] for the GRS of the Sun corresponds to the measured average value for the GRS of
published in :

The gravitational redshift of Sirius B

Example 6

The Gravitational Wave Equation.
Propagation of a Gravitational Wave in the z-direction
speed of light: $c = \frac{1}{\sqrt{\epsilon 0\, \mu 0}}$

In[ ]:=

Book : Rising of the James Webb Space Telescope and its Fundament
Example of a Spherical Beam of Light , propagating in the radial – di

with the speed of light $c = \frac{1}{\sqrt{\epsilon 0\, \mu 0}}$.

The input for the Electric Field Intensity {E (x, y, z,) = ev } and the Magnetic F
Equation for the Electromagnetic Field within a constant gravitational field with

$$-\frac{1}{c^2}\frac{\partial(\bar{E}\times\bar{H})}{\partial t} + \varepsilon_0\,\bar{E}\,(\nabla.\bar{E}) - \varepsilon_0\,\bar{E}\times(\nabla\times\bar{E}) + \mu_0\,\bar{H}\,(\nabla.\bar{H}) - \mu_0\,\bar{H}\times(\nabla\times\bar{H}) + \frac{1}{2}\Big(\varepsilon^2$$

Which can be written as :

$$\text{term1} = -\frac{1}{c^2}\frac{\partial(\bar{E}\times\bar{H})}{\partial t}$$

$$\text{term 2} = \varepsilon_0\,\bar{E}\,(\nabla.\bar{E})$$

$$\text{term3} = -\varepsilon_0\,\bar{E}\times(\nabla\times\bar{E})$$

$$\text{term4} = \mu_0\,\bar{H}\,(\nabla.\bar{H})$$

$$\text{term5} = -\mu_0 \, \overline{H} \times (\nabla \times \overline{H})$$

$$\text{term6} = -\frac{1}{2}\left(\varepsilon^2 \mu\left(\overline{E} . \overline{E}\right) + \varepsilon\, \mu^2 \left(\overline{H} . \overline{H}\right)\right)\overline{g}$$

Equation (73) equals :

$$\text{term1} + \text{term2} + \text{term3} + \text{term4} + \text{term5} + \text{term6} = 0$$

In[ ]:= ϵ0 =.

In[ ]:= μ0 =.

In[ ]:= x =.

In[ ]:= y =.

In[ ]:= z =.

In[ ]:= t =.

In[ ]:= Get["VectorAnalysis`"]

— General : VectorAnalysis` is now obsolete. The legacy version being loaded may conflict wit

In[ ]:= Get["Calculus`DSolve`"]

— Get : Cannot open Calculus`DSolve`.

Out[ ]= $Failed

In[ ]:= InverseFunctions → True

Out[ ]= InverseFunctions → True

In[ ]:=
```
Needs["DifferentialEquations`NDSolveProblems`"]
```

In[ ]:=
```
Needs["DifferentialEquations`NDSolveUtilities`"]
```

In[ ]:=
```
Needs["DifferentialEquations`InterpolatingFunctionAnatomy`"]
```

In[ ]:=
```
Get["Calculus`DSolveIntegrals`"]
```

— Get : Cannot open Calculus`DSolveIntegrals`.

Out[ ]= $Failed

In[ ]:=
```
SetCoordinates[Cartesian[x, y, z]]
```

Out[ ]= Cartesian[x, y, z]

In[ ]:=
```
{Coordinates[Cartesian], CoordinateRanges[Cartesian]}
```

Out[ ]= $\{\{x, y, z\}, \{-\infty < x < \infty, -\infty < y < \infty, -\infty < z < \infty\}\}$

In[ ]:=
```
G1 = .
```

In[ ]:= $h[x, y, z, t] = e^{-\frac{1}{2} z\, \epsilon0\, \mu0\, g[t - z \sqrt{\epsilon0} \sqrt{\mu0}]} f[t - z \sqrt{\epsilon0} \sqrt{\mu0}, x, y]$

Out[ ]= $e^{-\frac{1}{2} z\, \epsilon0\, \mu0\, g[t - z \sqrt{\epsilon0} \sqrt{\mu0}]} f[t - z \sqrt{\epsilon0} \sqrt{\mu0}, x, y]$

In[ ]:=
```
ev = { h[x, y, z, t] , 0, 0}
```

Out[ ]= $\{e^{-\frac{1}{2} z\, \epsilon0\, \mu0\, g[t - z \sqrt{\epsilon0} \sqrt{\mu0}]} f[t - z \sqrt{\epsilon0} \sqrt{\mu0}, x, y], 0, 0\}$

In[ ]:=
```
mv = (1 / Sqrt[μ0]) * Sqrt[ϵ0] *
 {0, h[x, y, z, t] , 0}
```

Out[ ]= $\left\{0, \frac{e^{-\frac{1}{2} z\, \epsilon0\, \mu0\, g[t - z \sqrt{\epsilon0} \sqrt{\mu0}]} \sqrt{\epsilon0}\, f[t - z \sqrt{\epsilon0} \sqrt{\mu0}, x, y]}{\sqrt{\mu0}}, 0\right\}$

In[ ]:= gv = {0, 0, g[(t − z √ϵ0 √μ0)]}

Out[ ]= $\{0, 0, g[t - z\sqrt{\epsilon 0}\sqrt{\mu 0}]\}$

In[ ]:= $\text{Intensity} = -\frac{1}{2}(\epsilon 0\,(\text{Dot}[ev, ev]) + \mu 0\,(\text{Dot}[mv, mv]))$

Out[ ]= $-\frac{1\left(e^{-z\,\epsilon 0\,\mu 0\,g[t - z\sqrt{\epsilon 0}\sqrt{\mu 0}]}\,\epsilon 0\,f[t - z\sqrt{\epsilon 0}\sqrt{\mu 0}, x, y]^2 + e^{-z\,\epsilon 0\,\mu 0\,g[t - z\sqrt{\epsilon 0}\sqrt{\mu 0}]}\,f[t - z\sqrt{\epsilon\right.}{2}$

In[ ]:= FullSimplify[%]

Out[ ]= $-\frac{e^{-z\,\epsilon 0\,\mu 0\,g[t - z\sqrt{\epsilon 0}\sqrt{\mu 0}]}\,f[t - z\sqrt{\epsilon 0}\sqrt{\mu 0}, x, y]^2\,1\,(\epsilon 0 + \epsilon 0)}{2}$

In[ ]:= Div[ev]

Out[ ]= $e^{-\frac{1}{2}z\,\epsilon 0\,\mu 0\,g[t - z\sqrt{\epsilon 0}\sqrt{\mu 0}]}\,f^{(0,1,0)}[t - z\sqrt{\epsilon 0}\sqrt{\mu 0}, x, y]$

In[ ]:= Div[mv]

Out[ ]= $\frac{e^{-\frac{1}{2}z\,\epsilon 0\,\mu 0\,g[t - z\sqrt{\epsilon 0}\sqrt{\mu 0}]}\sqrt{\epsilon 0}\,f^{(0,0,1)}[t - z\sqrt{\epsilon 0}\sqrt{\mu 0}, x, y]}{\sqrt{\mu 0}}$

In[ ]:= FullSimplify[%]

Out[ ]= $\frac{e^{-\frac{1}{2}z\,\epsilon 0\,\mu 0\,g[t - z\sqrt{\epsilon 0}\sqrt{\mu 0}]}\sqrt{\epsilon 0}\,f^{(0,0,1)}[t - z\sqrt{\epsilon 0}\sqrt{\mu 0}, x, y]}{\sqrt{\mu 0}}$

In[ ]:= term1a = D[Cross[ev, mv], t]

Out[ ]= $\{0, 0, -e^{-z\,\epsilon 0\,\mu 0\,g[t - z\sqrt{\epsilon 0}\sqrt{\mu 0}]}\,z\,\epsilon 0^{3/2}\sqrt{\mu 0}\,f[t - z\sqrt{\epsilon 0}\sqrt{\mu 0}, x, y]^2\,g'[t - z\sqrt{\epsilon 0}\sqrt{\mu 0}] +$

In[ ]:=

$$\text{term1} = -\frac{1}{c^2}\frac{\partial(\bar{E}\times\bar{H})}{\partial t}.$$

In[ ]:= term1 = ((−ϵ0) ∗ μ0) ∗ D[Cross[ev, mv], t]

Out[ ]= $\{0, 0, -\epsilon 0\,\mu 0\,\left(-e^{-z\,\epsilon 0\,\mu 0\,g[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}]}\,z\,\epsilon 0^{3/2}\sqrt{\mu 0}\,f[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}, x, y]^2\,g'[t-z\sqrt{\epsilon 0}\right.$

In[ ]:=

$$\text{term2} = \varepsilon_0\,\bar{E}\,(\nabla.\,\bar{E}).$$

In[ ]:= term2 = ϵ0 ∗ ev ∗ Div[ev]

Out[ ]= $\{e^{-z\,\epsilon 0\,\mu 0\,g[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}]}\,\epsilon 0\,f[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}, x, y]\,f^{(0,1,0)}[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}, x, y], 0, 0\}$

In[ ]:=

$$\text{term3} = -\varepsilon_0\,\bar{E}\times(\nabla\times\bar{E}).$$

In[ ]:= term3 = (−ϵ0) ∗ Cross[ev, Curl[ev]]

Out[ ]= $\{0, -e^{-z\,\epsilon 0\,\mu 0\,g[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}]}\,\epsilon 0\,f[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}, x, y]\,f^{(0,0,1)}[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}, x, y],$

$-\epsilon 0\left(-\frac{1}{2}e^{-z\,\epsilon 0\,\mu 0\,g[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}]}\,\epsilon 0\,\mu 0\,f[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}, x, y]^2\,g[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}] + \frac{1}{2}e^{-}\right.$

$e^{-z\,\epsilon 0\,\mu 0\,g[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}]}\sqrt{\epsilon 0}\sqrt{\mu 0}\,f[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}, x, y]\,f^{(1,0,0)}[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}, x,$

In[ ]:=

$$\text{term4} = \mu_0\,\bar{H}\,(\nabla.\,\bar{H}).$$

In[ ]:= term4 = μ0 ∗ mv ∗ Div[mv]

Out[ ]= $\{0, e^{-z\,\epsilon 0\,\mu 0\,g[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}]}\,\epsilon 0\,f[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}, x, y]\,f^{(0,0,1)}[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}, x, y], 0\}$

In[ ]:=

$$\text{term5} = -\mu_0\,\bar{H}\times(\nabla\times\bar{H}).$$

In[ ]:=
```
term5 = (-μ0)*Cross[mv, Curl[mv]]
```

Out[ ]= $\left\{-e^{-z\,\epsilon0\,\mu0\,g\left[t-z\sqrt{\epsilon0}\sqrt{\mu0}\right]}\,\epsilon0\,f\left[t-z\sqrt{\epsilon0}\sqrt{\mu0},x,y\right]f^{(0,1,0)}\left[t-z\sqrt{\epsilon0}\sqrt{\mu0},x,y\right],0,\right.$
$-\mu0\left(-\frac{1}{2}e^{-z\,\epsilon0\,\mu0\,g\left[t-z\sqrt{\epsilon0}\sqrt{\mu0}\right]}\,\epsilon0^2\,f\left[t-z\sqrt{\epsilon0}\sqrt{\mu0},x,y\right]^2 g\left[t-z\sqrt{\epsilon0}\sqrt{\mu0}\right]+\frac{1}{2}e^{-z\,\epsilon}\right.$
$\frac{e^{-z\,\epsilon0\,\mu0\,g\left[t-z\sqrt{\epsilon0}\sqrt{\mu0}\right]}\,\epsilon0^{3/2}\,f\left[t-z\sqrt{\epsilon0}\sqrt{\mu0},x,y\right]f^{(1,0,0)}\left[t-z\sqrt{\epsilon0}\sqrt{\mu0},x,y\right]}{\sqrt{\mu0}}$

$$\text{term6} = -\frac{1}{2}\left(\varepsilon^2\mu\left(\overline{E}\,.\,\overline{E}\right)+\varepsilon\,\mu^2\left(\overline{H}\,.\,\overline{H}\right)\right)\overline{g}$$

In[ ]:=
```
term6 = -(ϵ0^2 μ0/2 Dot[ev, ev] + ϵ0 μ0^2/2 Dot[mv, mv]) gv
```

Out[ ]= $\left\{0,0,-e^{-z\,\epsilon0\,\mu0\,g\left[t-z\sqrt{\epsilon0}\sqrt{\mu0}\right]}\,\epsilon0^2\,\mu0\,f\left[t-z\sqrt{\epsilon0}\sqrt{\mu0},x,y\right]^2 g\left[t-z\sqrt{\epsilon0}\sqrt{\mu0}\right]\right\}$

In[ ]:=
```
vergelijking = term1 + term2 + term3 + term4 + term5 + term6
```

Out[ ]= $\left\{0,0,-e^{-z\,\epsilon0\,\mu0\,g\left[t-z\sqrt{\epsilon0}\sqrt{\mu0}\right]}\,\epsilon0^2\,\mu0\,f\left[t-z\sqrt{\epsilon0}\sqrt{\mu0},x,y\right]^2 g\left[t-z\sqrt{\epsilon0}\sqrt{\mu0}\right]-\right.$
$\epsilon0\,\mu0\left(-e^{-z\,\epsilon0\,\mu0\,g\left[t-z\sqrt{\epsilon0}\sqrt{\mu0}\right]}\,z\,\epsilon0^{3/2}\sqrt{\mu0}\,f\left[t-z\sqrt{\epsilon0}\sqrt{\mu0},x,y\right]^2 g'\left[t-z\sqrt{\epsilon0}\sqrt{\mu0}\right.\right.$
$\mu0\left(-\frac{1}{2}e^{-z\,\epsilon0\,\mu0\,g\left[t-z\sqrt{\epsilon0}\sqrt{\mu0}\right]}\,\epsilon0^2\,f\left[t-z\sqrt{\epsilon0}\sqrt{\mu0},x,y\right]^2 g\left[t-z\sqrt{\epsilon0}\sqrt{\mu0}\right]+\frac{1}{2}e^{-z\,\epsilon}\right.$
$\frac{e^{-z\,\epsilon0\,\mu0\,g\left[t-z\sqrt{\epsilon0}\sqrt{\mu0}\right]}\,\epsilon0^{3/2}\,f\left[t-z\sqrt{\epsilon0}\sqrt{\mu0},x,y\right]f^{(1,0,0)}\left[t-z\sqrt{\epsilon0}\sqrt{\mu0},x,y\right]}{\sqrt{\mu0}}$
$\frac{1}{2}e^{-z\,\epsilon0\,\mu0\,g\left[t-z\sqrt{\epsilon0}\sqrt{\mu0}\right]}\,z\,\epsilon0^{3/2}\,\mu0^{3/2}\,f\left[t-z\sqrt{\epsilon0}\sqrt{\mu0},x,y\right]^2 g'\left[t-z\sqrt{\epsilon0}\sqrt{\mu0}\right]$

In[ ]:=

The electromagnetic force density in the x - direction equals :

In[ ]:=
```
xvergelijking = term1[[1]] + term2[[1]] + term3[[1]] + term4[[1]] +
  term5[[1]] + term6[[1]]
```

Out[ ]= 0

In[ ]:=
```
FullSimplify[%]
```

Out[ ]= 0

In[ ]:= xvergelijking1 = %

Out[ ]= 0

In[ ]:=

The electromagnetic force density in the y - direction equals :

In[ ]:= yvergelijking = term1[[2]] + term2[[2]] + term3[[2]] + term4[[2]] + term5[[2]] + term6[[2]]

Out[ ]= 0

In[ ]:= FullSimplify[%]

Out[ ]= 0

In[ ]:= yvergelijking1 = %

Out[ ]= 0

In[ ]:=

The electromagnetic force density in the z - direction equals :

In[ ]:= zvergelijking = term1[[3]] + term2[[3]] + term3[[3]] + term4[[3]] + term5[[3]] + term6[[3]]

Out[ ]=
$$-e^{-z\,\epsilon 0\,\mu 0\,g[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}]}\,\epsilon 0^2\,\mu 0\,f[t-z\sqrt{\epsilon 0}\sqrt{\mu 0},x,y]^2\,g[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}]-$$
$$\epsilon 0\,\mu 0\left(-e^{-z\,\epsilon 0\,\mu 0\,g[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}]}\,z\,\epsilon 0^{3/2}\sqrt{\mu 0}\,f[t-z\sqrt{\epsilon 0}\sqrt{\mu 0},x,y]^2\,g'[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}]\right.$$
$$\mu 0\left(-\frac{1}{2}e^{-z\,\epsilon 0\,\mu 0\,g[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}]}\,\epsilon 0^2\,f[t-z\sqrt{\epsilon 0}\sqrt{\mu 0},x,y]^2\,g[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}]+\right.$$
$$\frac{1}{2}e^{-z\,\epsilon 0\,\mu 0\,g[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}]}\,z\,\epsilon 0^{5/2}\sqrt{\mu 0}\,f[t-z\sqrt{\epsilon 0}\sqrt{\mu 0},x,y]^2\,g'[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}]-\cdot$$
$$\epsilon 0\left(-\frac{1}{2}e^{-z\,\epsilon 0\,\mu 0\,g[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}]}\,\epsilon 0\,\mu 0\,f[t-z\sqrt{\epsilon 0}\sqrt{\mu 0},x,y]^2\,g[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}]+\frac{1}{2}e^{-z}\right.$$
$$e^{-z\,\epsilon 0\,\mu 0\,g[t-z\sqrt{\epsilon 0}\sqrt{\mu 0}]}\sqrt{\epsilon 0}\sqrt{\mu 0}\,f[t-z\sqrt{\epsilon 0}\sqrt{\mu 0},x,y]\,f^{(1,0,0)}[t-z\sqrt{\epsilon 0}\sqrt{\mu 0},x,$$

In[ ]:= FullSimplify[%]

Out[ ]= 0

In[ ]:= zvergelijking1 = %

Out[ ]= 0

Results force densities in resp x-direction, y-direction, z-direction

Results for the electromagentic force densities in resp x-direction, y-direction, z-direction:

In[ ]:= xvergelijking1

Out[ ]= 0

In[ ]:= yvergelijking1

Out[ ]= 0

In[ ]:= zvergelijking1

Out[ ]= 0

According the force-density equations in the x-direction, y-
equals zero in every direction. This represents the solution for
It follows from the mathematical solution for the electromagne

$$ev = e^{-\frac{1}{2} G1\, z\, \epsilon0\, \mu0}\, g\left[e^{-G1\, \epsilon0\, \mu0}\left(t - z\sqrt{\epsilon0}\sqrt{\mu0}\right)\right]$$

that the intensity increases with the value:

$$\text{Intensity} = -\frac{1}{2}\left(\epsilon0\,(\text{Dot}[ev, ev]) + \mu0\,(\text{Dot}[mv, mv])\right)$$

$$-\frac{1\left(e^{-\frac{G1\, z\, \epsilon0\, \mu0}{2}}\, \epsilon0\, g\left[e^{-G1\, \epsilon0\, \mu0}\left(t-z\sqrt{\epsilon0}\sqrt{\mu0}\right)\right]^2 + e^{-\frac{G1\, z\, \epsilon0\, \mu0}{2}}\, g\left[e^{-G1\, \epsilon0\, \mu0}\left(t-z\sqrt{\epsilon0}\sqrt{\mu0}\right)\right]^2 \epsilon0\right)}{2}$$

The Electromagnetic Energy Intenstity is proportional to: $e^{-G1\, z\, \epsilon0\, \mu0}$
distance z in the direction opposite to the z-direction of the gra
The frequency is proportional to the energy density (book: Equatio
energy. The speed of light remains constant in a gravitational f

Within a Constant Gravitational Field G1 The observed Cosmo

$\omega_{\text{NLGR}} = \omega_0 \, e^{-\,g\,z\,\mu_0\,\varepsilon_0} \sqrt{\frac{1+\frac{v}{c}}{1-\frac{v}{c}}}$

The term $\left(\frac{\Delta\,\omega}{\omega} = e^{-\,g\,z\,\mu_0\,\varepsilon_0}\right)$

in Quantum Light Theory (QLT) differs

from the second term $\frac{1}{2!}\left(-\,g\,z\,\mu_0\,\varepsilon_0\right)^2$ in Taylors Series of the exp

the Classical Gravitational Frequency Shift:

$\left(\frac{\Delta\,\omega}{\omega} = -\,g\,z\,\mu_0\,\varepsilon_0\right)$ in General Relativity presented in

An improved approach for testing Gravitational Redshift via Satellite-Base three frequency links combination

Example 7

Spherical Propagation of a Beam of Light in the radial-direction with the speed of light: $c = \frac{1}{\sqrt{\epsilon 0\,\mu 0}}$.

In[ ]:= Book : Rising of the James Webb Space Telescope and
Example of a Spherical Propagation of a Beam of Light ,

propagating in the radial – direction with the speed of light :

The input for the Electric Field Intensity {E (x, y, z,) = ev } and the M
in the Field Equation for the Electromagnetic Field (Book Equation 19,

$$-\frac{1}{c^2}\frac{\partial(\bar{E}\times\bar{H})}{\partial t} + \varepsilon_0 \bar{E}(\nabla.\bar{E}) - \varepsilon_0 \bar{E}\times(\nabla\times\bar{E}) + \mu_0 \bar{H}(\nabla.\bar{H}) - \mu_0 \bar{H}\times(\nabla\times$$

Which can be written as :

$$\text{term1} = -\frac{1}{c^2}\frac{\partial(\bar{E}\times\bar{H})}{\partial t}$$

$$\text{term 2} = \varepsilon_0 \bar{E}(\nabla.\bar{E})$$

$$\text{term3} = -\varepsilon_0 \bar{E}\times(\nabla\times\bar{E})$$

$$\text{term4} = \mu_0 \bar{H}(\nabla.\bar{H})$$

$$\text{term5} = -\mu_0 \bar{H}\times(\nabla\times\bar{H})$$

Equation (19) equals :

$$\text{term1} + \text{term2} + \text{term3} + \text{term4} + \text{term5} = 0$$

In[ ]:= $\epsilon 0$ =.

In[ ]:= $\mu 0$ =.

In[ ]:=
```
r =.
```

In[ ]:=
```
θ =.
```

In[ ]:=
```
φ =.
```

In[ ]:=
```
t =.
```

In[ ]:=
```
InverseFunctions → True
```

Out[ ]=
```
InverseFunctions → True
```

In[ ]:=
```
Needs["DifferentialEquations`NDSolveProblems`"]
```

In[ ]:=
```
Needs["DifferentialEquations`NDSolveUtilities`"]
```

In[ ]:=
```
Needs["DifferentialEquations`InterpolatingFunctionAnatomy`"]
```

In[ ]:=
```
InverseFunctions → True
```

Out[ ]=
```
InverseFunctions → True
```

In[ ]:=
```
SetCoordinates[Spherical[r, θ, φ]]
```

Out[ ]=
```
Spherical[r, θ, φ]
```

In[ ]:=
```
{Coordinates[Spherical], CoordinateRanges[Spherical]}
```

Out[ ]=
```
{{r, θ, φ}, {0 ≤ r < ∞, 0 ≤ θ ≤ π, -π < φ ≤ π}}
```

In[ ]:=
```
CoordinatesToCartesian[Coordinates[Spherical], Spherical]
```

Out[ ]=
```
{r Cos[φ] Sin[θ], r Sin[θ] Sin[φ], r Cos[θ]}
```

In[ ]:=
```
ev = {0, (1/r)*f[θ, φ]*g[t - (K1/r + 1)*r*Sqrt[ϵ0]*
    Sqrt[μ0]], 0}
```

Out[ ]= $\left\{0, \frac{f[\theta, \varphi] \times g\left[t - \left(1 + \frac{K1}{r}\right) r \sqrt{\epsilon 0} \sqrt{\mu 0}\right]}{r}, 0\right\}$

In[ ]:=
```
mv = (1/Sqrt[μ0])*Sqrt[ϵ0]*{0, 0, (1/r)*f[θ, φ]*
   g[t - (K1/r + 1)*r*Sqrt[ϵ0]*Sqrt[μ0]]}
```

Out[ ]= $\left\{0, 0, \frac{\sqrt{\epsilon 0}\, f[\theta, \varphi] \times g\left[t - \left(1 + \frac{K1}{r}\right) r \sqrt{\epsilon 0} \sqrt{\mu 0}\right]}{r \sqrt{\mu 0}}\right\}$

In[ ]:=
```
Div[ev]
```

Out[ ]= $\frac{1}{r^2} \mathrm{Csc}[\theta] \left(\mathrm{Cos}[\theta]\, f[\theta, \varphi] \times g\left[t - \left(1 + \frac{K1}{r}\right) r \sqrt{\epsilon 0} \sqrt{\mu 0}\right] + g\left[t - \left(1 + \frac{K1}{r}\right) r \sqrt{\epsilon 0} \sqrt{\mu 0}\right]\right.$

In[ ]:=
```
Div[mv]
```

Out[ ]= $\frac{\sqrt{\epsilon 0}\, \mathrm{Csc}[\theta]\, g\left[t - \left(1 + \frac{K1}{r}\right) r \sqrt{\epsilon 0} \sqrt{\mu 0}\right] f^{(0,1)}[\theta, \varphi]}{r^2 \sqrt{\mu 0}}$

In[ ]:=
```
FullSimplify[%]
```

Out[ ]= $\frac{\sqrt{\epsilon 0}\, \mathrm{Csc}[\theta]\, g\left[t - (K1 + r) \sqrt{\epsilon 0} \sqrt{\mu 0}\right] f^{(0,1)}[\theta, \varphi]}{r^2 \sqrt{\mu 0}}$

In[ ]:=
```
term1a = D[Cross[ev, mv], t]
```

Out[ ]= $\left\{\frac{2 \sqrt{\epsilon 0}\, f[\theta, \varphi]^2 g\left[t - \left(1 + \frac{K1}{r}\right) r \sqrt{\epsilon 0} \sqrt{\mu 0}\right] g'\left[t - \left(1 + \frac{K1}{r}\right) r \sqrt{\epsilon 0} \sqrt{\mu 0}\right]}{r^2 \sqrt{\mu 0}}, 0, 0\right\}$

In[ ]:= $\text{term1} = -\frac{1}{c^2} \frac{\partial(\bar{E} \times \bar{H})}{\partial t}$

— ⋯ Derivative : $\partial\left(\bar{E} \times \bar{H}\right)$ cannot be interpreted. A partial derivative requires a subscript differen

In[ ]:= term1 = ((−ϵ0) ∗ μ0) ∗ D[Cross[ev, mv], t]

Out[ ]= $\left\{-\frac{2\,\epsilon0^{3/2}\,\sqrt{\mu0}\,f[\theta,\varphi]^2\,g\left[t-\left(1+\frac{K1}{r}\right)r\sqrt{\epsilon0}\,\sqrt{\mu0}\right]\,g'\left[t-\left(1+\frac{K1}{r}\right)r\sqrt{\epsilon0}\,\sqrt{\mu0}\right]}{r^2},\,0,\,0\right\}$

In[ ]:= term2 = $\varepsilon_0\,\bar{E}\,(\nabla.\bar{E})$

— Div : ∇.E cannot be interpreted. In a divergence, the del operator requires a subscript with

In[ ]:= term2 = ϵ0 ∗ ev ∗ Div[ev]

Out[ ]= $\left\{0,\,\frac{1}{r^3}\,\epsilon0\,Csc[\theta]\,f[\theta,\varphi]\times g\left[t-\left(1+\frac{K1}{r}\right)r\sqrt{\epsilon0}\,\sqrt{\mu0}\right]\left(Cos[\theta]\,f[\theta,\varphi]\times g\left[t-\left(1+\frac{K1}{r}\right.\right.\right.$

In[ ]:= term3 = $-\varepsilon_0\,\bar{E}\times(\nabla\times\bar{E})$

— General : ∇ × E cannot be interpreted. The prefix operator ∇ cannot be combined with the b

In[ ]:= term3 = (−ϵ0) ∗ Cross[ev, Curl[ev]]

Out[ ]= $\left\{\frac{\epsilon0^{3/2}\,\sqrt{\mu0}\,f[\theta,\varphi]^2\,g\left[t-\left(1+\frac{K1}{r}\right)r\sqrt{\epsilon0}\,\sqrt{\mu0}\right]\,g'\left[t-\left(1+\frac{K1}{r}\right)r\sqrt{\epsilon0}\,\sqrt{\mu0}\right]}{r^2},\,0,\,-\frac{\epsilon0\,C}{}\right.$

In[ ]:= term4 = $\mu_0\,\bar{H}\,(\nabla.\bar{H})$

— Div : ∇.H cannot be interpreted. In a divergence, the del operator requires a subscript with

In[ ]:= term4 = μ0 ∗ mv ∗ Div[mv]

Out[ ]= $\left\{0,\,0,\,\frac{\epsilon0\,Csc[\theta]\,f[\theta,\varphi]\,g\left[t-\left(1+\frac{K1}{r}\right)r\sqrt{\epsilon0}\,\sqrt{\mu0}\right]^2\,f^{(0,1)}[\theta,\varphi]}{r^3}\right\}$

In[ ]:= $\text{term5} = -\mu_0 \bar{H} \times (\nabla \times \bar{H})$

— General : $\nabla \times \bar{H}$ cannot be interpreted. The prefix operator ∇ cannot be combined with the b

In[ ]:= term5 = (−μ0) ∗ Cross[mv, Curl[mv]]

Out[ ]= $\left\{ \frac{\epsilon 0^{3/2} \sqrt{\mu 0}\, f[\theta, \varphi]^2 g\left[t - \left(1 + \frac{K1}{r}\right) r \sqrt{\epsilon 0} \sqrt{\mu 0}\right] g'\left[t - \left(1 + \frac{K1}{r}\right) r \sqrt{\epsilon 0} \sqrt{\mu 0}\right]}{r^2}, \right.$

$-\mu 0 \left(\frac{\epsilon 0\, \text{Cot}[\theta]\, f[\theta, \varphi]^2 g\left[t - \left(1 + \frac{K1}{r}\right) r \sqrt{\epsilon 0} \sqrt{\mu 0}\right]^2}{r^3 \mu 0} + \frac{\epsilon 0\, f[\theta, \varphi]\, g\left[t - \left(1 + \frac{K1}{r}\right) r \sqrt{\right.}{r^3 \mu 0} \right.$

In[ ]:= vergelijking = term1 + term2 + term3 + term4 + term5

Out[ ]= $\left\{ 0, -\mu 0 \left(\frac{\epsilon 0\, \text{Cot}[\theta]\, f[\theta, \varphi]^2 g\left[t - \left(1 + \frac{K1}{r}\right) r \sqrt{\epsilon 0} \sqrt{\mu 0}\right]^2}{r^3 \mu 0} + \frac{\epsilon 0\, f[\theta, \varphi]\, g\left[t - \left(1 + \frac{K1}{r}\right) r\right.}{r^3} \right. \right.$

$\frac{1}{r^3} \epsilon 0\, \text{Csc}[\theta]\, f[\theta, \varphi] \times g\left[t - \left(1 + \frac{K1}{r}\right) r \sqrt{\epsilon 0} \sqrt{\mu 0}\right] \left(\text{Cos}[\theta]\, f[\theta, \varphi] \times g\left[t - \left(1 + \frac{K1}{r}\right)\right.\right.$

In[ ]:= rvergelijking = term1[[1]] + term2[[1]] + term3[[1]] + term4[[1]] + term5[[1]]

Out[ ]= 0

In[ ]:= FullSimplify[%]

Out[ ]= 0

In[ ]:= rvergelijking1 = %

Out[ ]= 0

In[ ]:= θvergelijking = term1[[2]] + term2[[2]] + term3[[2]] + term4[[2]] + term5[[2]]

Out[ ]= $-\mu 0 \left(\frac{\epsilon 0\, \text{Cot}[\theta]\, f[\theta, \varphi]^2 g\left[t - \left(1 + \frac{K1}{r}\right) r \sqrt{\epsilon 0} \sqrt{\mu 0}\right]^2}{r^3 \mu 0} + \frac{\epsilon 0\, f[\theta, \varphi]\, g\left[t - \left(1 + \frac{K1}{r}\right) r \sqrt{\epsilon\right.}{r^3 \mu 0} \right.$

$\frac{1}{r^3} \epsilon 0\, \text{Csc}[\theta]\, f[\theta, \varphi] \times g\left[t - \left(1 + \frac{K1}{r}\right) r \sqrt{\epsilon 0} \sqrt{\mu 0}\right] \left(\text{Cos}[\theta]\, f[\theta, \varphi] \times g\left[t - \left(1 + \frac{K1}{r}\right)\right.\right.$

In[ ]:= FullSimplify[%]

Out[ ]= 0

In[ ]:= θvergelijking1 = %

Out[ ]= 0

In[ ]:= φvergelijking = term1⟦3⟧ + term2⟦3⟧ + term3⟦3⟧ + term4⟦3⟧ + term5⟦3⟧

Out[ ]= 0

In[ ]:= FullSimplify[%]

Out[ ]= 0

In[ ]:= φvergelijking1 = %

Out[ ]= 0

Results force densities in resp. r-direction, θ-direction, φ-direction

In[ ]:= rvergelijking1

Out[ ]= 0

In[ ]:= θvergelijking1

Out[ ]= 0

In[ ]:= φvergelijking1

Out[ ]= 0

Example 8

Introduction to Black Holes

In[ ]:= The concept of ' GEONs ' (**G**ravitational **E**lectr**o**magnetic E**n**tities

John Archibald Wheeler (a close friend of Albert Einstein) created
describes Electromagnetic Fields confined by their own gravitati
generated by their own electromagnetic mass (according Einstein

Geon (physics)

Geons

Method of the Self – Consistent Field in General Relativity and its

Book : Rising of the James Webb Space Telescope and its Fundar

The input for the Electric Field Intensity {E (x, y, z,) = ev } and the Mag
in the Field Equation for the Electromagnetic Field within a constant gra
with accelleration ' g ' in the ' r' – direction. (Book Equation 73, page 4

$$-\frac{1}{c^2}\frac{\partial(\bar{E}\times\bar{H})}{\partial t} + \varepsilon_0\,\bar{E}\,(\nabla.\,\bar{E}) - \varepsilon_0\,\bar{E}\times(\nabla\times\bar{E}) + \mu_0\,\bar{H}\,(\nabla.\,\bar{H}) - \mu_0\,\bar{H}\times(\nabla$$

Which can be written as :

$$\text{term1} = -\frac{1}{c^2}\frac{\partial(\bar{E}\times\bar{H})}{\partial t}$$

$$\text{term 2} = \varepsilon_0\,\bar{E}\,(\nabla.\,\bar{E})$$

$$\text{term3} = -\varepsilon_0\,\bar{E}\times(\nabla\times\bar{E})$$

$$\text{term4} = \mu_0\,\bar{H}\,(\nabla.\,\bar{H})$$

$$\text{term5} = -\mu_0\,\bar{H}\times(\nabla\times\bar{H})$$

$$\text{term6} = -\frac{1}{2}\left(\varepsilon^2\,\mu\left(\bar{E}\,.\,\bar{E}\right) + \varepsilon\,\mu^2\left(\bar{H}\,.\,\bar{H}\right)\right)\bar{g}$$

Equation (73) equals :

```
term1 + term2 + term3 + term4 + term5 + term6
```

Out[ ]= 1955. Archibald been by concept Electromagnetic Entities Gravitational has in int

```
In[ ]:= ϵ0 =.
```

```
In[ ]:= μ0 =.
```

```
In[ ]:= r =.
```

```
In[ ]:= θ =.
```

```
In[ ]:= φ =.
```

```
In[ ]:= t =.
```

```
In[ ]:= Get["VectorAnalysis`"]
```

— General : VectorAnalysis` is now obsolete. The legacy version being loaded may conflict wit

```
In[ ]:= InverseFunctions → True
```

Out[ ]= InverseFunctions → True

```
In[ ]:= Needs["DifferentialEquations`NDSolveProblems`"]
```

```
In[ ]:= Needs["DifferentialEquations`NDSolveUtilities`"]
```

```
In[ ]:= Needs["DifferentialEquations`InterpolatingFunctionAnatomy`"]
```

```
In[ ]:= r = .
```

In[ ]:=
```
SetCoordinates[Spherical[r, θ, φ]]
```

Out[ ]= Spherical[r, θ, φ]

In[ ]:=
```
{Coordinates[Spherical], CoordinateRanges[Spherical]}
```

Out[ ]= $\{\{r, \theta, \varphi\}, \{0 \le r < \infty, 0 \le \theta \le \pi, -\pi < \varphi \le \pi\}\}$

In[ ]:=
```
CoordinatesToCartesian[Coordinates[Spherical], Spherical]
```

Out[ ]= {r Cos[φ] Sin[θ], r Sin[θ] Sin[φ], r Cos[θ]}

In[ ]:=
```
f[r] = .
```

— Unset : Assignment on f for f[r] not found.

Out[ ]= $Failed

In[ ]:=
```
G1 = 6.67408 × 10^-11
```

Out[ ]= 6.67408×10^{-11}

In[ ]:=
```
Q1 = 1.6021765 × 10^-19
```

Out[ ]= 1.60218×10^{-19}

In[ ]:=
```
ϵ0 = 8.85 × 10^-12
```

Out[ ]= 8.85×10^{-12}

In[ ]:=
```
μ0 = 4 π 10^-7 // N
```

Out[ ]= 1.25664×10^{-6}

In[ ]:=
```
G1 = .
```

In[ ]:=
```
Q1 = .
```

In[ ]:= $\epsilon 0 = .$

In[ ]:= $\mu 0 = .$

In[ ]:= $\omega = .$

In[ ]:= Book : Rising of the James Webb Space Telescope and its Fundar

To find a solution for the GEON, a ' perfect equilibrium' has to b
Pressure' which forces the GEON to expand and the ' Gravitatonal
To find this ' perfect equilibrium' the radial directed part ' f[r]'
azimuthal and t angetial part g[θ, φ] of the electromagnetic radi
dependent part of the radiation has to be sinusoidal.

In[ ]:= ev = {0, f[r] × g[θ, φ] Sin[ω t], − f[r] × g[θ, φ] Cos[ω t]}

Out[ ]= $\{0, f[r] \times g[\theta, \varphi] \, Sin[t\,\omega], -Cos[t\,\omega] \, f[r] \times g[\theta, \varphi]\}$

In[ ]:= mv = (1 / Sqrt[μ0]) Sqrt[ϵ0] {0, f[r] × g[θ, φ] Cos[ω t], f[r] × g[θ, φ] Sin[ω t]}

Out[ ]= $$\left\{0, \frac{\sqrt{\epsilon 0}\, Cos[t\,\omega]\, f[r] \times g[\theta, \varphi]}{\sqrt{\mu 0}}, \frac{\sqrt{\epsilon 0}\, f[r] \times g[\theta, \varphi]\, Sin[t\,\omega]}{\sqrt{\mu 0}}\right\}$$

In[ ]:=

Book : Rising of the James Webb Space Telescope and its Fundamental Blindnes : Page 15, Equation
To define the Gravitational Field for the GEON, Newton' s Shell Theorem has been used.
All the mass (which can be calculated whith Einsteins : $W = m c^2$) of the confined electromagneti

In which the gravitational accelleration 'g' of the GEON equals :

$$g = \frac{G1}{4 \pi r^2}$$

and has been oriented in the radial direction of the GEON.

$$term6 = -\frac{1}{2}\left(\varepsilon^2 \mu\left(\overline{E}.\overline{E}\right) + \varepsilon\, \mu^2\left(\overline{H}.\overline{H}\right)\right)\overline{g}$$

$$term6 = -\frac{1}{2}\left(\varepsilon^2 \mu\left(\overline{E}.\overline{E}\right) + \varepsilon\, \mu^2\left(\overline{H}.\overline{H}\right)\right)\left\{\frac{G1}{4 \pi r^2}, 0, 0\right\}$$

in which G1 represents the total mass of the GEON.

In[ ]:= $gv = \left\{\frac{G1}{4 \pi r^2}, 0, 0\right\}$

Out[ ]= $\left\{\frac{G1}{4 \pi r^2}, 0, 0\right\}$

In[ ]:= ev

Out[ ]= {0, f[r] × g[θ, φ] Sin[t ω], -Cos[t ω] f[r] × g[θ, φ]}

In[ ]:= Div[ev]

Out[ ]= $\frac{1}{r^2}$ Csc[θ] (r Cos[θ] f[r] × g[θ, φ] Sin[t ω] - r Cos[t ω] f[r] $g^{(0,1)}$[θ, φ] + r f[r] S

In[ ]:= Div[mv]

Out[ ]= $\frac{1}{r^2}$ Csc[θ] $\left(\frac{r \sqrt{\epsilon 0}\, Cos[\theta]\, Cos[t\, \omega]\, f[r] \times g[\theta, \varphi]}{\sqrt{\mu 0}} + \frac{r \sqrt{\epsilon 0}\, f[r]\, Sin[t\, \omega]\, g^{(0,1)}[\theta, \varphi]}{\sqrt{\mu 0}}\right.$

In[ ]:= FullSimplify[%]

Out[ ]= $\frac{\sqrt{\epsilon 0}\, f[r]\, \left(Csc[\theta]\, Sin[t\, \omega]\, g^{(0,1)}[\theta, \varphi] + Cos[t\, \omega]\, \left(Cot[\theta]\, g[\theta, \varphi] + g^{(1,0)}[\theta, \varphi]\right)\right)}{r \sqrt{\mu 0}}$

In[ ]:= term1a = D[Cross[ev, mv], t]

Out[ ]= {0, 0, 0}

In[ ]:= term1 = ((−ϵ0) * μ0) * D[Cross[ev, mv], t]

Out[ ]= {0, 0, 0}

In[ ]:= term2 = ϵ0 * ev * Div[ev]

Out[ ]= $\left\{0, \frac{1}{r^2} \epsilon0 \,\text{Csc}[\theta]\, f[r] \times g[\theta, \varphi]\, \text{Sin}[t\,\omega] \left(r\,\text{Cos}[\theta]\, f[r] \times g[\theta, \varphi]\, \text{Sin}[t\,\omega] - r\,\text{Cos}[t\right.\right.$
$-\frac{1}{r^2} \epsilon0 \,\text{Cos}[t\,\omega]\, \text{Csc}[\theta]\, f[r] \times g[\theta, \varphi] \left(r\,\text{Cos}[\theta]\, f[r] \times g[\theta, \varphi]\, \text{Sin}[t\,\omega] - r\,\text{Cos}[t\,\omega\right.$

In[ ]:= term3 = (−ϵ0) * Cross[ev, Curl[ev]]

Out[ ]= $\left\{-\epsilon0 \left(\frac{\text{Cos}[t\,\omega]^2 f[r]^2 g[\theta, \varphi]^2}{r} + \frac{f[r]^2 g[\theta, \varphi]^2 \text{Sin}[t\,\omega]^2}{r} + \text{Cos}[t\,\omega]^2 f[r]\, g[\theta, \varphi]\right.\right.$
$-\epsilon0 \left(\frac{\text{Cos}[t\,\omega]^2 \text{Cot}[\theta]\, f[r]^2 g[\theta, \varphi]^2}{r} + \frac{\text{Cos}[t\,\omega]\, \text{Csc}[\theta]\, f[r]^2 g[\theta, \varphi]\, \text{Sin}[t\,\omega]\, g^{(0}}{r}\right.$
$-\epsilon0 \left(\frac{\text{Cos}[t\,\omega]\, \text{Cot}[\theta]\, f[r]^2 g[\theta, \varphi]^2 \text{Sin}[t\,\omega]}{r} + \frac{\text{Csc}[\theta]\, f[r]^2 g[\theta, \varphi]\, \text{Sin}[t\,\omega]^2 g^{(0}}{r}\right.$

In[ ]:= term4 = μ0 * mv * Div[mv]

Out[ ]= $\left\{0, \frac{1}{r^2} \sqrt{\epsilon0} \sqrt{\mu0}\, \text{Cos}[t\,\omega]\, \text{Csc}[\theta]\, f[r] \times g[\theta, \varphi] \left(\frac{r \sqrt{\epsilon0}\, \text{Cos}[\theta]\, \text{Cos}[t\,\omega]\, f[r] \times g[\theta,}{\sqrt{\mu0}}\right.\right.$
$\frac{1}{r^2} \sqrt{\epsilon0} \sqrt{\mu0}\, \text{Csc}[\theta]\, f[r] \times g[\theta, \varphi]\, \text{Sin}[t\,\omega] \left(\frac{r \sqrt{\epsilon0}\, \text{Cos}[\theta]\, \text{Cos}[t\,\omega]\, f[r] \times g[\theta, \varphi]}{\sqrt{\mu0}}\right.$

In[ ]:= term5 = (−μ0) * Cross[mv, Curl[mv]]

Out[ ]= $\left\{-\mu0 \left(\frac{\epsilon0\, \text{Cos}[t\,\omega]^2 f[r]^2 g[\theta, \varphi]^2}{r\,\mu0} + \frac{\epsilon0\, f[r]^2 g[\theta, \varphi]^2 \text{Sin}[t\,\omega]^2}{r\,\mu0} + \frac{\epsilon0\, \text{Cos}[t\,\omega]^2 f[r]}{\mu0}\right.\right.$
$-\mu0 \left(\frac{\epsilon0\, \text{Cot}[\theta]\, f[r]^2 g[\theta, \varphi]^2 \text{Sin}[t\,\omega]^2}{r\,\mu0} - \frac{\epsilon0\, \text{Cos}[t\,\omega]\, \text{Csc}[\theta]\, f[r]^2 g[\theta, \varphi]\, \text{Sin}[t}{r\,\mu0}\right.$
$-\mu0 \left(-\frac{\epsilon0\, \text{Cos}[t\,\omega]\, \text{Cot}[\theta]\, f[r]^2 g[\theta, \varphi]^2 \text{Sin}[t\,\omega]}{r\,\mu0} + \frac{\epsilon0\, \text{Cos}[t\,\omega]^2 \text{Csc}[\theta]\, f[r]^2 g[\theta}{r\,\mu0}\right.$

In[ ]:= Book : Rising of the James Webb Space Telescope and its Fundamental Blindnes : Page 15, Equation
To define the Gravitational Field for the GEON, Newton' s Shell Theorem has been used.
All the mass (which can be calculated whith Einsteins : $W = m c^2$) of the confined electromagneti

In which the gravitational accelleration 'g' of the GEON equals :

$$g = \frac{G1}{4 \pi r^2}$$

and has been oriented in the radial direction of the GEON.

$$term6 = -\frac{1}{2}\left(\varepsilon^2 \mu\left(\overline{E} . \overline{E}\right) + \varepsilon\ \mu^2\left(\overline{H} . \overline{H}\right)\right)\overline{g}$$

$$term6 = -\frac{1}{2}\left(\varepsilon^2 \mu\left(\overline{E} . \overline{E}\right) + \varepsilon\ \mu^2\left(\overline{H} . \overline{H}\right)\right)\left\{\frac{G1}{4 \pi r^2} 0, 0\right\}$$

in which G1 represents the total mass of the GEON.

In[ ]:= $term6 = -\left(\frac{\epsilon 0\, \mu 0^2}{2} \text{Dot[mv, mv]} + \frac{\epsilon 0^2\, \mu 0}{2} \text{Dot[ev, ev]}\right) gv$

Out[ ]= $\left\{\frac{1}{4 \pi r^2} G1 \left(-\frac{1}{2} \epsilon 0^2\, \mu 0 \left(\text{Cos}[t\, \omega]^2 f[r]^2 g[\theta, \varphi]^2 + f[r]^2 g[\theta, \varphi]^2 \text{Sin}[t\, \omega]^2\right) - \frac{1}{2} \epsilon 0\, \mu 0 \right.\right.$

In[●]:=
```
vergelijking = term1 + term2 + term3 + term4 + term5 + term6
```

Out[●]=
$$\left\{\frac{1}{4\pi r^2} G1 \left(-\frac{1}{2}\epsilon0^2 \mu0 \left(\text{Cos}[t\omega]^2 f[r]^2 g[\theta,\varphi]^2 + f[r]^2 g[\theta,\varphi]^2 \text{Sin}[t\omega]^2\right) - \frac{1}{2}\epsilon0\, \mu0\right.\right.$$
$$\epsilon0 \left(\frac{\text{Cos}[t\omega]^2 f[r]^2 g[\theta,\varphi]^2}{r} + \frac{f[r]^2 g[\theta,\varphi]^2 \text{Sin}[t\omega]^2}{r} + \text{Cos}[t\omega]^2 f[r]\, g[\theta,\varphi]^2\right.$$
$$\mu0 \left(\frac{\epsilon0\, \text{Cos}[t\omega]^2 f[r]^2 g[\theta,\varphi]^2}{r\,\mu0} + \frac{\epsilon0\, f[r]^2 g[\theta,\varphi]^2 \text{Sin}[t\omega]^2}{r\,\mu0} + \frac{\epsilon0\, \text{Cos}[t\omega]^2 f[r]}{\mu0}\right.$$
$$-\epsilon0 \left(\frac{\text{Cos}[t\omega]^2 \text{Cot}[\theta]\, f[r]^2 g[\theta,\varphi]^2}{r} + \frac{\text{Cos}[t\omega]\, \text{Csc}[\theta]\, f[r]^2 g[\theta,\varphi]\, \text{Sin}[t\omega]\, g^{(0}}{r}\right.$$
$$\frac{1}{r^2}\sqrt{\epsilon0}\,\sqrt{\mu0}\, \text{Cos}[t\omega]\, \text{Csc}[\theta]\, f[r] \times g[\theta,\varphi] \left(\frac{r\sqrt{\epsilon0}\, \text{Cos}[\theta]\, \text{Cos}[t\omega]\, f[r] \times g[\theta,\varphi}{\sqrt{\mu0}}\right.$$
$$\frac{1}{r^2}\epsilon0\, \text{Csc}[\theta]\, f[r] \times g[\theta,\varphi]\, \text{Sin}[t\omega] \left(r\, \text{Cos}[\theta]\, f[r] \times g[\theta,\varphi]\, \text{Sin}[t\omega] - r\, \text{Cos}[t\omega\right.$$
$$\mu0 \left(\frac{\epsilon0\, \text{Cot}[\theta]\, f[r]^2 g[\theta,\varphi]^2 \text{Sin}[t\omega]^2}{r\,\mu0} - \frac{\epsilon0\, \text{Cos}[t\omega]\, \text{Csc}[\theta]\, f[r]^2 g[\theta,\varphi]\, \text{Sin}[t}{r\,\mu0}\right.$$
$$\frac{1}{r^2}\sqrt{\epsilon0}\,\sqrt{\mu0}\, \text{Csc}[\theta]\, f[r] \times g[\theta,\varphi]\, \text{Sin}[t\omega] \left(\frac{r\sqrt{\epsilon0}\, \text{Cos}[\theta]\, \text{Cos}[t\omega]\, f[r] \times g[\theta,\varphi]}{\sqrt{\mu0}}\right.$$
$$\epsilon0 \left(\frac{\text{Cos}[t\omega]\, \text{Cot}[\theta]\, f[r]^2 g[\theta,\varphi]^2 \text{Sin}[t\omega]}{r} + \frac{\text{Csc}[\theta]\, f[r]^2 g[\theta,\varphi]\, \text{Sin}[t\omega]^2 g^{(0}}{r}\right.$$
$$\mu0 \left(-\frac{\epsilon0\, \text{Cos}[t\omega]\, \text{Cot}[\theta]\, f[r]^2 g[\theta,\varphi]^2 \text{Sin}[t\omega]}{r\,\mu0} + \frac{\epsilon0\, \text{Cos}[t\omega]^2 \text{Csc}[\theta]\, f[r]^2 g[\theta,}{r\,\mu0}\right.$$
$$\frac{1}{r^2}\epsilon0\, \text{Cos}[t\omega]\, \text{Csc}[\theta]\, f[r] \times g[\theta,\varphi] \left(r\, \text{Cos}[\theta]\, f[r] \times g[\theta,\varphi]\, \text{Sin}[t\omega] - r\, \text{Cos}[t\omega\right.$$

In[●]:=
```
rvergelijking = term1⟦1⟧ + term2⟦1⟧ + term3⟦1⟧ + term4⟦1⟧ +
  term5⟦1⟧ + term6⟦1⟧
```

Out[●]=
$$\frac{1}{4\pi r^2} G1 \left(-\frac{1}{2}\epsilon0^2 \mu0 \left(\text{Cos}[t\omega]^2 f[r]^2 g[\theta,\varphi]^2 + f[r]^2 g[\theta,\varphi]^2 \text{Sin}[t\omega]^2\right) - \frac{1}{2}\epsilon0\, \mu0^2\right.$$
$$\epsilon0 \left(\frac{\text{Cos}[t\omega]^2 f[r]^2 g[\theta,\varphi]^2}{r} + \frac{f[r]^2 g[\theta,\varphi]^2 \text{Sin}[t\omega]^2}{r} + \text{Cos}[t\omega]^2 f[r]\, g[\theta,\varphi]^2\right.$$
$$\mu0 \left(\frac{\epsilon0\, \text{Cos}[t\omega]^2 f[r]^2 g[\theta,\varphi]^2}{r\,\mu0} + \frac{\epsilon0\, f[r]^2 g[\theta,\varphi]^2 \text{Sin}[t\omega]^2}{r\,\mu0} + \frac{\epsilon0\, \text{Cos}[t\omega]^2 f[r]\, g}{\mu0}\right.$$

In[●]:=
```
FullSimplify[%]
```

Out[●]=
$$-\frac{\epsilon0\, f[r]\, g[\theta,\varphi]^2 \left((8\pi r + G1\,\epsilon0\,\mu0)\, f[r] + 8\pi r^2 f'[r]\right)}{4\pi r^2}$$

In[ ]:= rvergelijking1 = %

Out[ ]= $-\frac{\epsilon 0\, f[r]\, g[\theta,\varphi]^2 \left((8\pi r + G1\,\epsilon 0\,\mu 0)\, f[r] + 8\pi r^2 f'[r]\right)}{4\pi r^2}$

In[ ]:= θvergelijking = term1⟦2⟧ + term2⟦2⟧ + term3⟦2⟧ + term4⟦2⟧ + term5⟦2⟧ + term6⟦2⟧

Out[ ]= $-\epsilon 0 \left(\frac{\text{Cos}[t\,\omega]^2\,\text{Cot}[\theta]\, f[r]^2\, g[\theta,\varphi]^2}{r} + \frac{\text{Cos}[t\,\omega]\,\text{Csc}[\theta]\, f[r]^2\, g[\theta,\varphi]\,\text{Sin}[t\,\omega]\, g^{(0,}}{r}\right.$

$\frac{1}{r^2}\sqrt{\epsilon 0}\,\sqrt{\mu 0}\,\text{Cos}[t\,\omega]\,\text{Csc}[\theta]\, f[r] \times g[\theta,\varphi] \left(\frac{r\sqrt{\epsilon 0}\,\text{Cos}[\theta]\,\text{Cos}[t\,\omega]\, f[r] \times g[\theta,\varphi]}{\sqrt{\mu 0}}\right.$

$\frac{1}{r^2}\,\epsilon 0\,\text{Csc}[\theta]\, f[r] \times g[\theta,\varphi]\,\text{Sin}[t\,\omega]\,\left(r\,\text{Cos}[\theta]\, f[r] \times g[\theta,\varphi]\,\text{Sin}[t\,\omega] - r\,\text{Cos}[t\,\omega]\right.$

$\mu 0 \left(\frac{\epsilon 0\,\text{Cot}[\theta]\, f[r]^2\, g[\theta,\varphi]^2\,\text{Sin}[t\,\omega]^2}{r\,\mu 0} - \frac{\epsilon 0\,\text{Cos}[t\,\omega]\,\text{Csc}[\theta]\, f[r]^2\, g[\theta,\varphi]\,\text{Sin}[t\,\omega}{r\,\mu 0}\right.$

In[ ]:= FullSimplify[%]

Out[ ]= 0

In[ ]:= θvergelijking1 = %

Out[ ]= 0

In[ ]:= φvergelijking = term1⟦3⟧ + term2⟦3⟧ + term3⟦3⟧ + term4⟦3⟧ + term5⟦3⟧ + term6⟦3⟧

Out[ ]= $\frac{1}{r^2}\sqrt{\epsilon 0}\,\sqrt{\mu 0}\,\text{Csc}[\theta]\, f[r] \times g[\theta,\varphi]\,\text{Sin}[t\,\omega]\left(\frac{r\sqrt{\epsilon 0}\,\text{Cos}[\theta]\,\text{Cos}[t\,\omega]\, f[r] \times g[\theta,\varphi]}{\sqrt{\mu 0}} -\right.$

$\epsilon 0 \left(\frac{\text{Cos}[t\,\omega]\,\text{Cot}[\theta]\, f[r]^2\, g[\theta,\varphi]^2\,\text{Sin}[t\,\omega]}{r} + \frac{\text{Csc}[\theta]\, f[r]^2\, g[\theta,\varphi]\,\text{Sin}[t\,\omega]^2\, g^{(0,1}}{r}\right.$

$\mu 0 \left(-\frac{\epsilon 0\,\text{Cos}[t\,\omega]\,\text{Cot}[\theta]\, f[r]^2\, g[\theta,\varphi]^2\,\text{Sin}[t\,\omega]}{r\,\mu 0} + \frac{\epsilon 0\,\text{Cos}[t\,\omega]^2\,\text{Csc}[\theta]\, f[r]^2\, g[\theta,}{r\,\mu 0}\right.$

$\frac{1}{r^2}\,\epsilon 0\,\text{Cos}[t\,\omega]\,\text{Csc}[\theta]\, f[r] \times g[\theta,\varphi]\,\left(r\,\text{Cos}[\theta]\, f[r] \times g[\theta,\varphi]\,\text{Sin}[t\,\omega] - r\,\text{Cos}[t\,\omega]\right.$

In[ ]:= FullSimplify[%]

Out[ ]= 0

In[ ]:= φvergelijking1 = %

Out[ ]= 0

Results force densities in resp r-direction, θ-direction, φ-direction

In[ ]:= rvergelijking1

Out[ ]= $-\frac{\epsilon 0\, f[r]\, g[\theta, \varphi]^2 \left((8\pi r + G1\, \epsilon 0\, \mu 0)\, f[r] + 8\pi r^2 f'[r]\right)}{4\pi r^2}$

In[ ]:= θvergelijking1

Out[ ]= 0

In[ ]:= φvergelijking1

Out[ ]= 0

Example 5
Gravitational-Electromagnetic confinement for GEONs.

In[ ]:= Book : Rising of the James Webb Space Telescope and its Fundar

To establish a ' Perfect Equilibrium' between the radiation pressur
and the gravitational confining force density, the 'rvergelijking1' in

$$(8\pi r + G1\, \epsilon 0\, \mu 0)\, f[r] + 8\pi r^2 f'[r] = 0$$

In[ ]:= f[r] = .

— Unset : Assignment on f for f[r] not found.

Out[ ]= $Failed

In[ ]:= DSolve[(8 π r + G1 ϵ0 μ0) f[r] + 8 π r^2 f′[r] == 0, f[r], r]

Out[ ]= $\left\{\left\{f[r] \to e^{-\frac{-\frac{G1\, \epsilon 0\, \mu 0}{r} + 8\pi \,\mathrm{Log}[r]}{8\pi}}\, c_1\right\}\right\}$

In[ ]:= The solution for Equation (73) in the radial direction equals :

$$f[r] = K1\, e^{-\frac{-\frac{G1\,\epsilon 0\,\mu 0}{r}+8\,\pi\,Log[r]}{8\,\pi}}$$

in which K1 an arbitrary value.

— Set : Tag Times in 73 direction Equation for in radial solution the The (equals : f[r]) is Protecte

Out[ ]= $e^{-\frac{-\frac{G1\,\epsilon 0\,\mu 0}{r}+8\,\pi\,Log[r]}{8\,\pi}}\, K1$

In[ ]:= Book : Rising of the James Webb Space Telescope and its Fundar

The input for the Electric Field Intensity {E (x, y, z,) = ev } and the Mag
in the Field Equation for the Electromagnetic Field within a constant gra
with accelleration ' g ' in the ' r' – direction. (Book Equation 73, page 47

$$-\frac{1}{c^2}\frac{\partial(\bar{E}\times\bar{H})}{\partial t}+\varepsilon_0\,\bar{E}\,(\nabla.\bar{E})-\varepsilon_0\,\bar{E}\times(\nabla\times\bar{E})+\mu_0\,\bar{H}\,(\nabla.\bar{H})-\mu_0\,\bar{H}\times(\nabla$$

Which can be written as :

$$\text{term1} = -\frac{1}{c^2}\frac{\partial(\bar{E}\times\bar{H})}{\partial t}$$

$$\text{term 2} = \varepsilon_0\,\bar{E}\,(\nabla.\bar{E})$$

$$\text{term3} = -\varepsilon_0\,\bar{E}\times(\nabla\times\bar{E})$$

$$\text{term4} = \mu_0\,\bar{H}\,(\nabla.\bar{H})$$

$$\text{term5} = -\mu_0\,\bar{H}\times(\nabla\times\bar{H})$$

$$\text{term6} = -\frac{1}{2}\left(\varepsilon^2\,\mu\left(\bar{E}\,.\,\bar{E}\right)+\varepsilon\,\mu^2\left(\bar{H}\,.\,\bar{H}\right)\right)\bar{g}$$

Equation (73) equals :

term1 + term2 + term3 + term4 + term5 + term6

In[ ]:= ϵ0 =.

In[ ]:= μ0 =.

```
In[ ]:= r =.

In[ ]:= θ =.

In[ ]:= φ =.

In[ ]:= t =.

In[ ]:= InverseFunctions → True

Out[ ]= InverseFunctions → True

In[ ]:= Needs["DifferentialEquations`NDSolveProblems`"]

In[ ]:= Needs["DifferentialEquations`NDSolveUtilities`"]

In[ ]:= Needs["DifferentialEquations`InterpolatingFunctionAnatomy`"]

In[ ]:= InverseFunctions → True

Out[ ]= InverseFunctions → True

In[ ]:= Get["VectorAnalysis`"]

— General : VectorAnalysis` is now obsolete. The legacy version being loaded may conflict wit

In[ ]:= r = .

In[ ]:= SetCoordinates[Spherical[r, θ, φ]]

Out[ ]= Spherical[r, θ, φ]

In[ ]:= {Coordinates[Spherical], CoordinateRanges[Spherical]}

Out[ ]= {{r, θ, φ}, {0 ≤ r < ∞, 0 ≤ θ ≤ π, -π < φ ≤ π}}
```

In[ ]:= CoordinatesToCartesian[Coordinates[Spherical], Spherical]

Out[ ]= {r Cos[φ] Sin[θ], r Sin[θ] Sin[φ], r Cos[θ]}

In[ ]:= f[r] = .

— Unset : Assignment on f for f[r] not found.

Out[ ]= $Failed

In[ ]:= n = .

In[ ]:= ϵ0 =.

In[ ]:= μ0 =.

In[ ]:= Q1 = .

In[ ]:= G1 = 6.67408×10^{-11}

Out[ ]= 6.67408×10^{-11}

In[ ]:= Q1 = $1.6021765 \times 10^{-19}$

Out[ ]= 1.60218×10^{-19}

In[ ]:= ϵ0 = 8.85×10^{-12}

Out[ ]= 8.85×10^{-12}

In[ ]:= μ0 = $4 \pi 10^{-7}$ // N

Out[ ]= 1.25664×10^{-6}

In[ ]:= G1 = .

In[ ]:= Q1 = .

In[ ]:= ϵ0 = .

In[ ]:= μ0 = .

In[ ]:= $f[r] = K1\, e^{-\frac{-\frac{G1\,\epsilon0\,\mu0}{r}+8\pi\,\mathrm{Log}[r]}{8\pi}}$

Out[ ]= $e^{-\frac{-\frac{G1\,\epsilon0\,\mu0}{r}+8\pi\,\mathrm{Log}[r]}{8\pi}}\, K1$

In[ ]:= ev = {0, f[r] Sin[ω t], − f[r] Cos[t ω]}

Out[ ]= $\left\{0,\ e^{-\frac{-\frac{G1\,\epsilon0\,\mu0}{r}+8\pi\,\mathrm{Log}[r]}{8\pi}}\, K1\, \mathrm{Sin}[t\,\omega],\ -e^{-\frac{-\frac{G1\,\epsilon0\,\mu0}{r}+8\pi\,\mathrm{Log}[r]}{8\pi}}\, K1\, \mathrm{Cos}[t\,\omega]\right\}$

In[ ]:= mv = (1 / Sqrt[μ0]) Sqrt[ϵ0] {0, f[r] Cos[t ω], f[r] Sin[t ω]}

Out[ ]= $\left\{0,\ \frac{e^{-\frac{-\frac{G1\,\epsilon0\,\mu0}{r}+8\pi\,\mathrm{Log}[r]}{8\pi}}\, K1\,\sqrt{\epsilon0}\,\mathrm{Cos}[t\,\omega]}{\sqrt{\mu0}},\ \frac{e^{-\frac{-\frac{G1\,\epsilon0\,\mu0}{r}+8\pi\,\mathrm{Log}[r]}{8\pi}}\, K1\,\sqrt{\epsilon0}\,\mathrm{Sin}[t\,\omega]}{\sqrt{\mu0}}\right\}$

In[ ]:= $gv = \left\{\frac{G1}{4\pi\, r^2}, 0, 0\right\}$

Out[ ]= $\left\{\frac{G1}{4\pi\, r^2}, 0, 0\right\}$

In[ ]:= ev

Out[ ]= $\left\{0,\ e^{-\frac{-\frac{G1\,\epsilon0\,\mu0}{r}+8\pi\,\mathrm{Log}[r]}{8\pi}}\, K1\, \mathrm{Sin}[t\,\omega],\ -e^{-\frac{-\frac{G1\,\epsilon0\,\mu0}{r}+8\pi\,\mathrm{Log}[r]}{8\pi}}\, K1\, \mathrm{Cos}[t\,\omega]\right\}$

In[ ]:= Div[ev]

Out[ ]= $\frac{e^{-\frac{-\frac{G1\,\epsilon0\,\mu0}{r}+8\pi\,\mathrm{Log}[r]}{8\pi}}\, K1\,\mathrm{Cot}[\theta]\,\mathrm{Sin}[t\,\omega]}{r}$

In[●]:= Div[mv]

Out[●]= $\frac{e^{-\frac{-\frac{G1\,\epsilon 0\,\mu 0}{r}+8\pi\,\text{Log}[r]}{8\pi}}\,\text{K1}\,\sqrt{\epsilon 0}\,\text{Cos}[t\,\omega]\,\text{Cot}[\theta]}{r\,\sqrt{\mu 0}}$

In[●]:= FullSimplify[%]

Out[●]= $\frac{e^{\frac{G1\,\epsilon 0\,\mu 0}{8\pi r}}\,\text{K1}\,\sqrt{\epsilon 0}\,\text{Cos}[t\,\omega]\,\text{Cot}[\theta]}{r^2\,\sqrt{\mu 0}}$

In[●]:= term1a = D[Cross[ev, mv], t]

Out[●]= {0, 0, 0}

In[●]:= term1 = ((−ϵ0) ∗ μ0) ∗ D[Cross[ev, mv], t]

Out[●]= {0, 0, 0}

In[●]:= term2 = ϵ0 ∗ ev ∗ Div[ev]

Out[●]= $\left\{0, \frac{e^{-\frac{-\frac{G1\,\epsilon 0\,\mu 0}{r}+8\pi\,\text{Log}[r]}{4\pi}}\,\text{K1}^2\,\epsilon 0\,\text{Cot}[\theta]\,\text{Sin}[t\,\omega]^2}{r}, -\frac{e^{-\frac{-\frac{G1\,\epsilon 0\,\mu 0}{r}+8\pi\,\text{Log}[r]}{4\pi}}\,\text{K1}^2\,\epsilon 0\,\text{Cos}[t\,\omega]\,\text{Cot}}{r}\right.$

In[●]:= term3 = (−ϵ0) ∗ Cross[ev, Curl[ev]]

Out[●]= $\left\{-\epsilon 0\left(-\frac{e^{-\frac{-\frac{G1\,\epsilon 0\,\mu 0}{r}+8\pi\,\text{Log}[r]}{4\pi}}\,\text{G1}\,\text{K1}^2\,\epsilon 0\,\mu 0\,\text{Cos}[t\,\omega]^2}{8\pi r^2}-\frac{e^{-\frac{-\frac{G1\,\epsilon 0\,\mu 0}{r}+8\pi\,\text{Log}[r]}{4\pi}}\,\text{G1}\,\text{K1}^2\,\epsilon 0\,\mu 0\,\text{Sin}[t}{8\pi r^2}\right.\right.$

In[●]:= term4 = μ0 ∗ mv ∗ Div[mv]

Out[●]= $\left\{0, \frac{e^{-\frac{-\frac{G1\,\epsilon 0\,\mu 0}{r}+8\pi\,\text{Log}[r]}{4\pi}}\,\text{K1}^2\,\epsilon 0\,\text{Cos}[t\,\omega]^2\,\text{Cot}[\theta]}{r}, \frac{e^{-\frac{-\frac{G1\,\epsilon 0\,\mu 0}{r}+8\pi\,\text{Log}[r]}{4\pi}}\,\text{K1}^2\,\epsilon 0\,\text{Cos}[t\,\omega]\,\text{Cot}[}{r}\right.$

In[ ]:= term5 = (−μ0) ∗ Cross[mv, Curl[mv]]

Out[ ]= $\left\{-\mu 0\left(-\frac{e^{\frac{G1\,\epsilon 0\,\mu 0}{4\pi r}}\,G1\,K1^2\,\epsilon 0^2\,\mathrm{Cos}[t\,\omega]^2}{8\pi r^4}-\frac{e^{\frac{G1\,\epsilon 0\,\mu 0}{4\pi r}}\,G1\,K1^2\,\epsilon 0^2\,\mathrm{Sin}[t\,\omega]^2}{8\pi r^4}\right),\ -\frac{e^{-\frac{-\frac{G1\,\epsilon 0\,\mu 0}{r}+8\pi\,\mathrm{Log}[r}{4\pi}}}{}\right.$

In[ ]:= term6 = −(ϵ0 μ0²/2 Dot[mv, mv] + ϵ0² μ0/2 Dot[ev, ev]) gv

Out[ ]= $\left\{\frac{1}{4\pi r^2}\,G1\left(-\frac{1}{2}\,\epsilon 0^2\,\mu 0\left(e^{-\frac{-\frac{G1\,\epsilon 0\,\mu 0}{r}+8\pi\,\mathrm{Log}[r]}{4\pi}}\,K1^2\,\mathrm{Cos}[t\,\omega]^2+e^{-\frac{-\frac{G1\,\epsilon 0\,\mu 0}{r}+8\pi\,\mathrm{Log}[r]}{4\pi}}\,K1^2\,\mathrm{Sin}[t\,\omega]^2\right.\right.\right.$

In[ ]:= vergelijking = term1 + term2 + term3 + term4 + term5 + term6

Out[ ]= $\left\{-\mu 0\left(-\frac{e^{\frac{G1\,\epsilon 0\,\mu 0}{4\pi r}}\,G1\,K1^2\,\epsilon 0^2\,\mathrm{Cos}[t\,\omega]^2}{8\pi r^4}-\frac{e^{\frac{G1\,\epsilon 0\,\mu 0}{4\pi r}}\,G1\,K1^2\,\epsilon 0^2\,\mathrm{Sin}[t\,\omega]^2}{8\pi r^4}\right)-\epsilon 0\left(-\frac{e^{-\frac{-\frac{G1\,\epsilon 0\,\mu 0}{r}+8}{4\pi}}}{}\right.\right.$

$\frac{1}{4\pi r^2}\,G1\left(-\frac{1}{2}\,\epsilon 0^2\,\mu 0\left(e^{-\frac{-\frac{G1\,\epsilon 0\,\mu 0}{r}+8\pi\,\mathrm{Log}[r]}{4\pi}}\,K1^2\,\mathrm{Cos}[t\,\omega]^2+e^{-\frac{-\frac{G1\,\epsilon 0\,\mu 0}{r}+8\pi\,\mathrm{Log}[r]}{4\pi}}\,K1^2\,\mathrm{Sin}[t\,\omega]\right.\right.$

In[ ]:= rvergelijking = term1⟦1⟧ + term2⟦1⟧ + term3⟦1⟧ + term4⟦1⟧ + term5⟦1⟧ + term6⟦1⟧

Out[ ]= $-\mu 0\left(-\frac{e^{\frac{G1\,\epsilon 0\,\mu 0}{4\pi r}}\,G1\,K1^2\,\epsilon 0^2\,\mathrm{Cos}[t\,\omega]^2}{8\pi r^4}-\frac{e^{\frac{G1\,\epsilon 0\,\mu 0}{4\pi r}}\,G1\,K1^2\,\epsilon 0^2\,\mathrm{Sin}[t\,\omega]^2}{8\pi r^4}\right)-\epsilon 0\left(-\frac{e^{-\frac{-\frac{G1\,\epsilon 0\,\mu 0}{r}+8\pi\,\mathrm{l}}{4\pi}}}{}\right.$

$\frac{1}{4\pi r^2}\,G1\left(-\frac{1}{2}\,\epsilon 0^2\,\mu 0\left(e^{-\frac{-\frac{G1\,\epsilon 0\,\mu 0}{r}+8\pi\,\mathrm{Log}[r]}{4\pi}}\,K1^2\,\mathrm{Cos}[t\,\omega]^2+e^{-\frac{-\frac{G1\,\epsilon 0\,\mu 0}{r}+8\pi\,\mathrm{Log}[r]}{4\pi}}\,K1^2\,\mathrm{Sin}[t\,\omega]^2\right.\right.$

In[ ]:= FullSimplify[%]

Out[ ]= 0

In[ ]:= rvergelijking1 = %

Out[ ]= 0

In[ ]:= θvergelijking = term1〚2〛 + term2〚2〛 + term3〚2〛 + term4〚2〛 + term5〚2〛 + term6〚2〛

Out[ ]= 0

In[ ]:= FullSimplify[%]

Out[ ]= 0

In[ ]:= θvergelijking1 = %

Out[ ]= 0

In[ ]:= φvergelijking = term1〚3〛 + term2〚3〛 + term3〚3〛 + term4〚3〛 + term5〚3〛 + term6〚3〛

Out[ ]= 0

In[ ]:= FullSimplify[%]

Out[ ]= 0

In[ ]:= φvergelijking1 = %

Out[ ]= 0

Results force densities in resp r-direction, θ-direction, φ-direction

In[ ]:= rvergelijking1

Out[ ]= 0

In[ ]:= θvergelijking1

Out[ ]= 0

In[ ]:= φvergelijking1

Out[ ]= 0

To establish a ‘Perfect Equilibrium’ between the radiation pressure,

and the gravitational confining force density in the radial r-direction
electromagnetic force density equals zero in every direction. This rep

This result represents Newton's ideas about a Universal Harmony.

Example 6
Graphical Presentation of a GEON.

In[ ]:=

The concept of ' GEONs ' (**G**ravitational **E**lectr**o**magnetic E**n**tities

Book : Rising of the James Webb Space Telescope and its Fundar

The input for the Electric Field Intensity {E (x, y, z,) = ev } and the Mag
in the Field Equation for the Electromagnetic Field within a constant gra
with accelleration ' g ' in the 'r' – direction. (Book Equation 73, page 47

$$-\frac{1}{c^2}\frac{\partial(\bar{E}\times\bar{H})}{\partial t}+\varepsilon_0\bar{E}(\nabla.\bar{E})-\varepsilon_0\bar{E}\times(\nabla\times\bar{E})+\mu_0\bar{H}(\nabla.\bar{H})-\mu_0\bar{H}\times(\nabla$$

Which can be written as :

$$\text{term1} = -\frac{1}{c^2}\frac{\partial(\bar{E}\times\bar{H})}{\partial t}$$

$$\text{term 2} = \varepsilon_0\,\bar{E}\,(\nabla.\bar{E})$$

$$\text{term3} = -\varepsilon_0\,\bar{E}\times(\nabla\times\bar{E})$$

$$\text{term4} = \mu_0\,\bar{H}\,(\nabla.\bar{H})$$

$$\text{term5} = -\mu_0\,\bar{H}\times(\nabla\times\bar{H})$$

$$\text{term6} = -\frac{1}{2}\left(\varepsilon^2\mu\left(\bar{E}.\bar{E}\right)+\varepsilon\,\mu^2\left(\bar{H}.\bar{H}\right)\right)\bar{g}$$

Equation (73) equals :

term1 + term2 + term3 + term4 + term5 + term6

Out[ ]= 1955. Archibald been by concept Electromagnetic Entities Gravitational has in into

In[ ]:= ϵ0 =.

```
In[ ]:= μ0 =.

In[ ]:= r =.

In[ ]:= θ =.

In[ ]:= φ =.

In[ ]:= t =.

In[ ]:= InverseFunctions → True

Out[ ]= InverseFunctions → True

In[ ]:= Needs["DifferentialEquations`NDSolveProblems`"]

In[ ]:= Needs["DifferentialEquations`NDSolveUtilities`"]

In[ ]:= Needs["DifferentialEquations`InterpolatingFunctionAnatomy`"]

In[ ]:= InverseFunctions → True

Out[ ]= InverseFunctions → True

In[ ]:= Get["VectorAnalysis`"]

— General : VectorAnalysis` is now obsolete. The legacy version being loaded may conflict wit

In[ ]:= r = .

In[ ]:= SetCoordinates[Spherical[r, θ, φ]]

Out[ ]= Spherical[r, θ, φ]
```

In[ ]:= {Coordinates[Spherical], CoordinateRanges[Spherical]}

Out[ ]= $\{\{r, \theta, \varphi\}, \{0 \le r < \infty, 0 \le \theta \le \pi, -\pi < \varphi \le \pi\}\}$

In[ ]:= CoordinatesToCartesian[Coordinates[Spherical], Spherical]

Out[ ]= {r Cos[φ] Sin[θ], r Sin[θ] Sin[φ], r Cos[θ]}

In[ ]:= f[r] = .

In[ ]:= n = .

In[ ]:= ϵ0 =.

In[ ]:= μ0 =.

In[ ]:= Q1 = .

In[ ]:= G1 = 6.67408×10^{-11}

Out[ ]= 6.67408×10^{-11}

In[ ]:= Q1 = $1.6021765 \times 10^{-19}$

Out[ ]= 1.60218×10^{-19}

In[ ]:= ϵ0 = 8.85×10^{-12}

Out[ ]= 8.85×10^{-12}

In[ ]:= μ0 = $4 \pi 10^{-7}$ // N

Out[ ]= 1.25664×10^{-6}

In[ ]:= G1 = .

In[ ]:= Q1 = .

In[ ]:= ϵ0 = .

In[ ]:= μ0 = .

In[ ]:= $f[r] = K1\, e^{-\frac{-\frac{G1\,\epsilon0\,\mu0}{r}+8\pi\,\mathrm{Log}[r]}{8\pi}}$

Out[ ]= $e^{-\frac{-\frac{G1\,\epsilon0\,\mu0}{r}+8\pi\,\mathrm{Log}[r]}{8\pi}}\,K1$

In[ ]:= ev = {0, f[r] Sin[ω t], − f[r] Cos[t ω]}

Out[ ]= $\left\{0,\ e^{-\frac{-\frac{G1\,\epsilon0\,\mu0}{r}+8\pi\,\mathrm{Log}[r]}{8\pi}}\,K1\,\mathrm{Sin}[t\,\omega],\ -e^{-\frac{-\frac{G1\,\epsilon0\,\mu0}{r}+8\pi\,\mathrm{Log}[r]}{8\pi}}\,K1\,\mathrm{Cos}[t\,\omega]\right\}$

In[ ]:= mv = (1 / Sqrt[μ0]) Sqrt[ϵ0] {0, f[r] Cos[t ω], f[r] Sin[t ω]}

Out[ ]= $\left\{0,\ \frac{e^{-\frac{-\frac{G1\,\epsilon0\,\mu0}{r}+8\pi\,\mathrm{Log}[r]}{8\pi}}\,K1\,\sqrt{\epsilon0}\,\mathrm{Cos}[t\,\omega]}{\sqrt{\mu0}},\ \frac{e^{-\frac{-\frac{G1\,\epsilon0\,\mu0}{r}+8\pi\,\mathrm{Log}[r]}{8\pi}}\,K1\,\sqrt{\epsilon0}\,\mathrm{Sin}[t\,\omega]}{\sqrt{\mu0}}\right\}$

In[ ]:= $gv = \left\{\frac{G1}{4\pi\, r^2}, 0, 0\right\}$

Out[ ]= $\left\{\frac{G1}{4\pi\, r^2}, 0, 0\right\}$

In[ ]:= ev

Out[ ]= $\left\{0,\ e^{-\frac{-\frac{G1\,\epsilon0\,\mu0}{r}+8\pi\,\mathrm{Log}[r]}{8\pi}}\,K1\,\mathrm{Sin}[t\,\omega],\ -e^{-\frac{-\frac{G1\,\epsilon0\,\mu0}{r}+8\pi\,\mathrm{Log}[r]}{8\pi}}\,K1\,\mathrm{Cos}[t\,\omega]\right\}$

In[ ]:= Div[ev]

Out[ ]= $\frac{e^{-\frac{-\frac{G1\,\epsilon0\,\mu0}{r}+8\pi\,\mathrm{Log}[r]}{8\pi}}\,K1\,\mathrm{Cot}[\theta]\,\mathrm{Sin}[t\,\omega]}{r}$

In[ ]:= Div[mv]

Out[ ]= $\frac{e^{-\frac{-\frac{G1\,\epsilon0\,\mu0}{r}+8\pi\,\text{Log}[r]}{8\pi}}\,K1\,\sqrt{\epsilon0}\,\text{Cos}[t\,\omega]\,\text{Cot}[\theta]}{r\,\sqrt{\mu0}}$

In[ ]:= FullSimplify[%]

Out[ ]= $\frac{e^{\frac{G1\,\epsilon0\,\mu0}{8\pi r}}\,K1\,\sqrt{\epsilon0}\,\text{Cos}[t\,\omega]\,\text{Cot}[\theta]}{r^2\,\sqrt{\mu0}}$

In[ ]:= term1a = D[Cross[ev, mv], t]

Out[ ]= {0, 0, 0}

In[ ]:= term1 = ((−ϵ0) * μ0) * D[Cross[ev, mv], t]

Out[ ]= {0, 0, 0}

In[ ]:= term2 = ϵ0 * ev * Div[ev]

Out[ ]= $\left\{0, \frac{e^{-\frac{-\frac{G1\,\epsilon0\,\mu0}{r}+8\pi\,\text{Log}[r]}{4\pi}}\,K1^2\,\epsilon0\,\text{Cot}[\theta]\,\text{Sin}[t\,\omega]^2}{r}, -\frac{e^{-\frac{-\frac{G1\,\epsilon0\,\mu0}{r}+8\pi\,\text{Log}[r]}{4\pi}}\,K1^2\,\epsilon0\,\text{Cos}[t\,\omega]\,\text{Cot}}{r}\right.$

In[ ]:= term3 = (−ϵ0) * Cross[ev, Curl[ev]]

Out[ ]= $\left\{-\epsilon0\left(-\frac{e^{-\frac{-\frac{G1\,\epsilon0\,\mu0}{r}+8\pi\,\text{Log}[r]}{4\pi}}\,G1\,K1^2\,\epsilon0\,\mu0\,\text{Cos}[t\,\omega]^2}{8\pi\,r^2}-\frac{e^{-\frac{-\frac{G1\,\epsilon0\,\mu0}{r}+8\pi\,\text{Log}[r]}{4\pi}}\,G1\,K1^2\,\epsilon0\,\mu0\,\text{Sin}[t}{8\pi\,r^2}\right.\right.$

In[ ]:= term4 = μ0 * mv * Div[mv]

Out[ ]= $\left\{0, \frac{e^{-\frac{-\frac{G1\,\epsilon0\,\mu0}{r}+8\pi\,\text{Log}[r]}{4\pi}}\,K1^2\,\epsilon0\,\text{Cos}[t\,\omega]^2\,\text{Cot}[\theta]}{r}, \frac{e^{-\frac{-\frac{G1\,\epsilon0\,\mu0}{r}+8\pi\,\text{Log}[r]}{4\pi}}\,K1^2\,\epsilon0\,\text{Cos}[t\,\omega]\,\text{Cot}[}{r}\right.$

In[ ]:= term5 = (−μ0) * Cross[mv, Curl[mv]]

Out[ ]= $\left\{-\mu 0\left(-\frac{e^{\frac{G1 \in 0 \mu 0}{4 \pi r}} G1\, K1^2 \in 0^2 \operatorname{Cos}[t\,\omega]^2}{8 \pi r^4}-\frac{e^{\frac{G1 \in 0 \mu 0}{4 \pi r}} G1\, K1^2 \in 0^2 \operatorname{Sin}[t\,\omega]^2}{8 \pi r^4}\right), -\frac{e^{-\frac{-\frac{G1 \in 0 \mu 0}{r}+8 \pi \operatorname{Log}[r}{4 \pi}}}{}\right.$

In[ ]:= term6 = $-\left(\frac{\epsilon 0\, \mu 0^2}{2}\text{ Dot[mv, mv]} + \frac{\epsilon 0^2\, \mu 0}{2}\text{ Dot[ev, ev]}\right)$ gv

Out[ ]= $\left\{\frac{1}{4 \pi r^2} G1\left(-\frac{1}{2} \in 0^2 \mu 0\left(e^{-\frac{-\frac{G1 \in 0 \mu 0}{r}+8 \pi \operatorname{Log}[r]}{4 \pi}} K1^2 \operatorname{Cos}[t\,\omega]^2+e^{-\frac{-\frac{G1 \in 0 \mu 0}{r}+8 \pi \operatorname{Log}[r]}{4 \pi}} K1^2 \operatorname{Sin}[t\,\omega]^2\right.\right.\right.$

In[ ]:= vergelijking = term1 + term2 + term3 + term4 + term5 + term6

Out[ ]= $\left\{-\mu 0\left(-\frac{e^{\frac{G1 \in 0 \mu 0}{4 \pi r}} G1\, K1^2 \in 0^2 \operatorname{Cos}[t\,\omega]^2}{8 \pi r^4}-\frac{e^{\frac{G1 \in 0 \mu 0}{4 \pi r}} G1\, K1^2 \in 0^2 \operatorname{Sin}[t\,\omega]^2}{8 \pi r^4}\right)-\in 0\left(-\frac{e^{-\frac{-\frac{G1 \in 0 \mu 0}{r}+8}{4 \pi}}}{}\right.\right.$

$\frac{1}{4 \pi r^2} G1\left(-\frac{1}{2} \in 0^2 \mu 0\left(e^{-\frac{-\frac{G1 \in 0 \mu 0}{r}+8 \pi \operatorname{Log}[r]}{4 \pi}} K1^2 \operatorname{Cos}[t\,\omega]^2+e^{-\frac{-\frac{G1 \in 0 \mu 0}{r}+8 \pi \operatorname{Log}[r]}{4 \pi}} K1^2 \operatorname{Sin}[t\,\omega]\right.\right.$

In[ ]:= rvergelijking = term1⟦1⟧ + term2⟦1⟧ + term3⟦1⟧ + term4⟦1⟧ + term5⟦1⟧ + term6⟦1⟧

Out[ ]= $-\mu 0\left(-\frac{e^{\frac{G1 \in 0 \mu 0}{4 \pi r}} G1\, K1^2 \in 0^2 \operatorname{Cos}[t\,\omega]^2}{8 \pi r^4}-\frac{e^{\frac{G1 \in 0 \mu 0}{4 \pi r}} G1\, K1^2 \in 0^2 \operatorname{Sin}[t\,\omega]^2}{8 \pi r^4}\right)-\in 0\left(-\frac{e^{-\frac{-\frac{G1 \in 0 \mu 0}{r}+8 \pi}{4 \pi}}}{}\right.$

$\frac{1}{4 \pi r^2} G1\left(-\frac{1}{2} \in 0^2 \mu 0\left(e^{-\frac{-\frac{G1 \in 0 \mu 0}{r}+8 \pi \operatorname{Log}[r]}{4 \pi}} K1^2 \operatorname{Cos}[t\,\omega]^2+e^{-\frac{-\frac{G1 \in 0 \mu 0}{r}+8 \pi \operatorname{Log}[r]}{4 \pi}} K1^2 \operatorname{Sin}[t\,\omega]^2\right.\right.$

In[ ]:= FullSimplify[%]

Out[ ]= 0

In[ ]:= rvergelijking1 = %

Out[ ]= 0

In[ ]:=
```
θvergelijking = term1[[2]] + term2[[2]] + term3[[2]] + term4[[2]] +
  term5[[2]] + term6[[2]]
```
Out[ ]= 0

In[ ]:=
```
FullSimplify[%]
```
Out[ ]= 0

In[ ]:=
```
θvergelijking1 = %
```
Out[ ]= 0

In[ ]:=
```
φvergelijking = term1[[3]] + term2[[3]] + term3[[3]] + term4[[3]] +
  term5[[3]] + term6[[3]]
```
Out[ ]= 0

In[ ]:=
```
FullSimplify[%]
```
Out[ ]= 0

In[ ]:=
```
φvergelijking1 = %
```
Out[ ]= 0

Results force densities in resp r-direction, θ-direction, φ-direction

In[ ]:=
```
rvergelijking1
```
Out[ ]= 0

In[ ]:=
```
θvergelijking1
```
Out[ ]= 0

In[ ]:=
```
φvergelijking1
```
Out[ ]= 0

In[ ]:= The radial function' f[r]' for the electromagnetic − gravitational confinement (GEON) equals : f[r] = K1
In thebook : ' Rising of theJamesWebb SpaceTelescope and its Fundamental Blindness', page104, Figu
a graphic Plot has been presented for the GEON with the chosen value for K1 = 6.67408×10^{-11}

— ⋯ Set : Tag Plus in −confinement GEON gravitational $\left(\text{equals} : e^{-\frac{\text{Times[≪5≫]+Times[≪3≫]}}{8\pi}} \text{K1}\right)$ + electr

Out[ ]= $e^{-\frac{-\frac{G1\,\epsilon 0\,\mu 0}{r}+8\pi\,\text{Log}[r]}{8\pi}}\,\text{K1}$

In[ ]:= $\epsilon 0 = 8.85 \times 10^{-12}$

Out[ ]= 8.85×10^{-12}

In[ ]:= $\mu 0 = 4\pi\, 10^{-7}$

Out[ ]= $\frac{\pi}{2\,500\,000}$

In[ ]:= The value for the gravitational constant G1 equals

Out[ ]= constant equals for gravitational the The value G1

In[ ]:= $G1 = 6.67408 \times 10^{-11}$

Out[ ]= 6.67408×10^{-11}

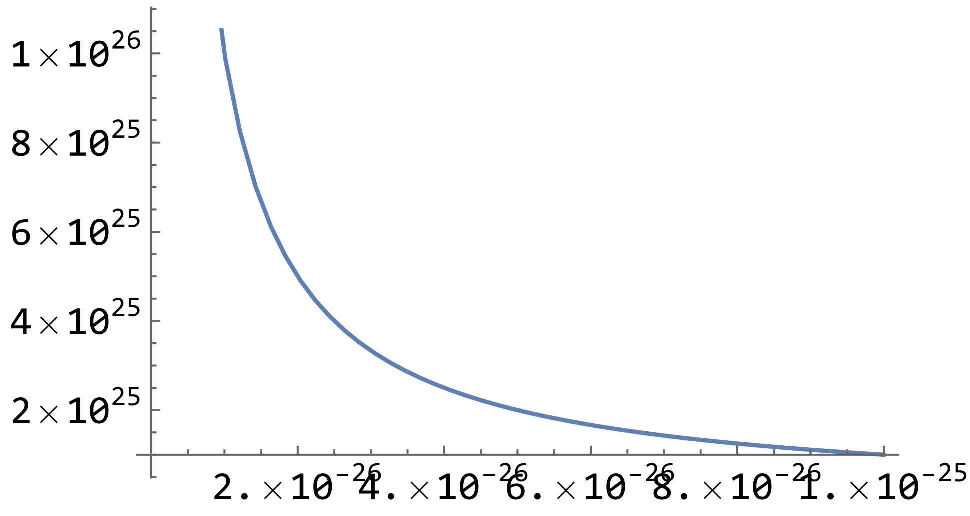
In[ ]:= $f[r] = K\, e^{-\frac{-\frac{G1\,\epsilon 0\,\mu 0}{r}+8\pi\,\text{Log}[r]}{8\pi}}$

Out[ ]= $e^{-\frac{-\frac{7.4224\times 10^{-28}}{r}+8\pi\,\text{Log}[r]}{8\pi}}\,K$

In[ ]:= $K = 0.00001$

Out[ ]= 0.00001

In[ ]:= $\text{Plot}\left[e^{-\frac{-\frac{K\,G1\,\epsilon0\,\mu0}{r}+8\,\pi\,\text{Log}[r]}{8\,\pi}},\ \{r,\ 10^{-36},\ 10^{-25}\}\right]$

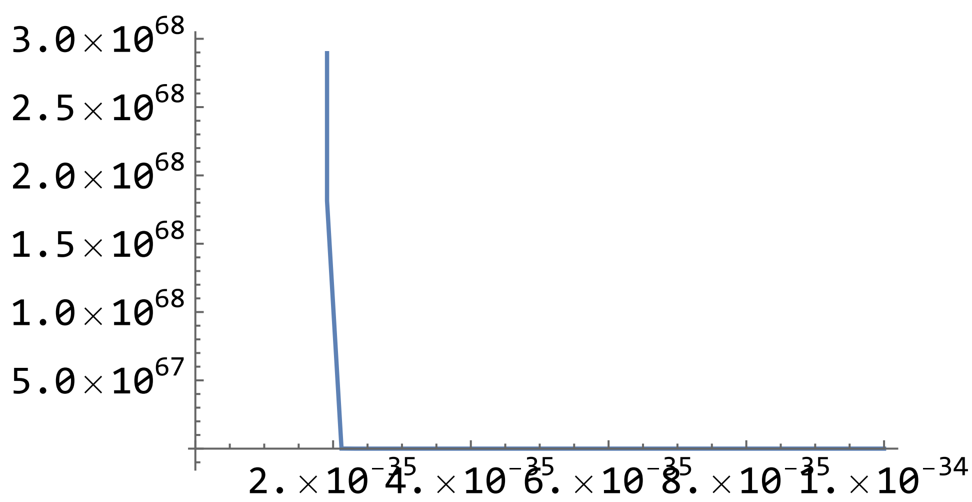
Out[ ]=


In[ ]:= In the book 'Rising of the James Webb Space Telescope' Figure 5, page 105,
represents the graphic Plot for the GEON with the arbitrary constant K chosen at a five times higher valu

In[ ]:= K2 = 0.00005

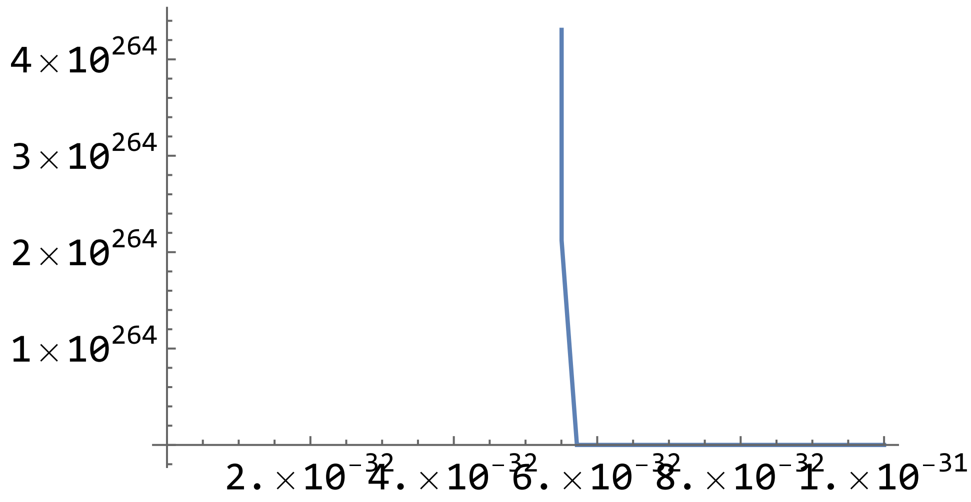
Out[ ]= 0.00005

In[ ]:= $\text{Plot}\left[e^{-\frac{-\frac{K2\,G1\,\epsilon0\,\mu0}{r}+8\,\pi\,\text{Log}[r]}{8\,\pi}},\ \{r,\ 10^{-36},\ 10^{-34}\}\right]$

Out[ ]=


In[ ]:= Choosing for the arbitrary constant K, the value K equals 1 , represents a GEON with a thousand times

In[ ]:= Plot$\left[e^{-\frac{-\frac{G1\,\epsilon 0\,\mu 0}{r}+8\pi\,\text{Log}[r]}{8\pi}},\ \{r, 0, 10^{-31}\}\right]$

Out[ ]=


In[ ]:= Choosing for the arbitrary constant K, the value K equals 1 , represents a GEON with a thousand times
intensity and the magnetic field intensity, the conclusion follows :

The stronger the electromagnetic field

The radius of the GEON is ***inversely p***
(Electromagnetic Mass) of the GEON.

Example 7
Universal Harmony

In[ ]:= Book : Rising of the James Webb Space Telescope and its Fundamental
Isaac Newton believed like many scientists of his time in a Universal (C
(Newton and the Mystery of the Major Sixth) and in Paintings. Thi

$$-\frac{1}{c^2}\frac{\partial(\bar{\mathbf{E}}\times\bar{\mathbf{H}})}{\partial t}+\varepsilon_0\,\bar{\mathbf{E}}\,(\nabla.\bar{\mathbf{E}})-\varepsilon_0\,\bar{\mathbf{E}}\times(\nabla\times\bar{\mathbf{E}})+\mu_0\,\bar{\mathbf{H}}\,(\nabla.\bar{\mathbf{H}})-\mu_0\,\bar{\mathbf{H}}\times(\nabla\times\bar{\mathbf{H}})$$

Example of Newton' s Universal (Cosmic) Harmony within an arbitrary
with an arbitrary ' Electric and Magnetic Field Intensity Division ' g[x, y]
propagating in the z – direction with the speed of light c $= \frac{1}{\sqrt{\epsilon 0\,\mu 0}}$.

In[ ]:=
```
Needs["DifferentialEquations`NDSolveProblems`"]
```

In[ ]:=
```
Needs["DifferentialEquations`NDSolveUtilities`"]
```

In[ ]:=
```
Needs["DifferentialEquations`InterpolatingFunctionAnatomy`"]
```

In[ ]:=
```
ϵ0 =.
```

In[ ]:=
```
μ0 =.
```

In[ ]:=
```
x =.
```

In[ ]:=
```
y =.
```

In[ ]:=
```
z =.
```

In[ ]:=
```
t =.
```

In[ ]:=
```
Get["VectorAnalysis`"]
```

— General : VectorAnalysis` is now obsolete. The legacy version being loaded may conflict wit

In[ ]:=
```
InverseFunctions → True
```

Out[ ]= InverseFunctions → True

In[ ]:=
```
Needs["DifferentialEquations`NDSolveProblems`"]
```

In[ ]:=
```
Needs["DifferentialEquations`NDSolveUtilities`"]
```

In[ ]:=
```
Needs["DifferentialEquations`InterpolatingFunctionAnatomy`"]
```

In[ ]:=
```
SetCoordinates[Cartesian[x, y, z]]
```

Out[ ]= Cartesian[x, y, z]

In[ ]:=
```
{Coordinates[Cartesian], CoordinateRanges[Cartesian]}
```

Out[ ]= $\{\{x, y, z\}, \{-\infty < x < \infty, -\infty < y < \infty, -\infty < z < \infty\}\}$

In[ ]:=
```
g[z, t] =.
```

— Unset : Assignment on g for g[z, t] not found.

Out[ ]= $Failed

In[ ]:=
```
f[x,  y] =.
```

In[ ]:=
```
f[x, y] =.
```

— Unset : Assignment on f for f[x, y] not found.

Out[ ]= $Failed

In[ ]:=
```
K1 = 1
```

Out[ ]= 1

In[ ]:=
```
ev = {f[x, y] * g[t - (K1 / z + 1) * z * Sqrt[ϵ0] * Sqrt[μ0]] , 0, 0}
```

Out[ ]= $\left\{f[x, y] \times g\left[t - \left(1 + \frac{1}{z}\right) z \sqrt{\epsilon 0} \sqrt{\mu 0}\right], 0, 0\right\}$

In[ ]:=
```
mv = (1 / Sqrt[μ0]) * Sqrt[ϵ0] *
  {0, f[x, y] * g[t - (K1 / z + 1) * z * Sqrt[ϵ0] * Sqrt[μ0]], 0}
```

Out[ ]= $\left\{0, \frac{\sqrt{\epsilon 0}\, f[x, y] \times g\left[t - \left(1 + \frac{1}{z}\right) z \sqrt{\epsilon 0} \sqrt{\mu 0}\right]}{\sqrt{\mu 0}}, 0\right\}$

In[•]:= Book : Rising of the James Webb Space Telescope and

Example of a LASER – BEAM with a Gaussian Intensity di

combined with an arbitrary division g[x, y] in the (x, y) plane

The input for the Electric Field Intensity {E (x, y, z,) = ev } and the M
in the Field Equation for the Electromagnetic Field (Book Equation 19,

$$-\frac{1}{c^2}\frac{\partial(\bar{\mathbf{E}}\times\bar{\mathbf{H}})}{\partial t}+\varepsilon_0\,\bar{\mathbf{E}}\,(\nabla.\bar{\mathbf{E}})-\varepsilon_0\,\bar{\mathbf{E}}\times(\nabla\times\bar{\mathbf{E}})+\mu_0\,\bar{\mathbf{H}}\,(\nabla.\bar{\mathbf{H}})-\mu_0\,\bar{\mathbf{H}}\times(\nabla\times$$

Which can be written as :

$$\text{term1} = -\frac{1}{c^2}\frac{\partial(\bar{E}\times\bar{H})}{\partial t}$$

$$\text{term 2} = \varepsilon_0\,\bar{E}\,(\nabla.\bar{E})$$

$$\text{term3} = -\varepsilon_0\,\bar{E}\times(\nabla\times\bar{E})$$

$$\text{term4} = \mu_0\,\bar{H}\,(\nabla.\bar{H})$$

$$\text{term5} = -\mu_0\,\bar{H}\times(\nabla\times\bar{H})$$

Equation (19) equals :

$$\text{term1} + \text{term2} + \text{term3} + \text{term4} + \text{term5} = 0$$

In[•]:=
```
Div[ev]
```

Out[•]= $g\left[t-\left(1+\frac{1}{z}\right) z\sqrt{\epsilon 0}\sqrt{\mu 0}\right] f^{(1,0)}[x, y]$

In[ ]:=
```
Div[mv]
```

Out[ ]=
$$\frac{\sqrt{\epsilon 0}\, g\left[t-\left(1+\frac{1}{z}\right) z \sqrt{\epsilon 0} \sqrt{\mu 0}\right] f^{(0,1)}[x, y]}{\sqrt{\mu 0}}$$

In[ ]:=
```
FullSimplify[%]
```

Out[ ]=
$$\frac{\sqrt{\epsilon 0}\, g\left[t-(1+z) \sqrt{\epsilon 0} \sqrt{\mu 0}\right] f^{(0,1)}[x, y]}{\sqrt{\mu 0}}$$

In[ ]:=
```
term1a = D[Cross[ev, mv], t]
```

Out[ ]=
$$\left\{0, 0, \frac{2 \sqrt{\epsilon 0}\, f[x, y]^2 g\left[t-\left(1+\frac{1}{z}\right) z \sqrt{\epsilon 0} \sqrt{\mu 0}\right] g'\left[t-\left(1+\frac{1}{z}\right) z \sqrt{\epsilon 0} \sqrt{\mu 0}\right]}{\sqrt{\mu 0}}\right\}$$

In[ ]:=
$$\text{term1} = -\frac{1}{c^2} \frac{\partial(\bar{E} \times \bar{H})}{\partial t}$$

— ⋯ Derivative : $\partial\left(\bar{E} \times \bar{H}\right)$ cannot be interpreted. A partial derivative requires a subscript differen

In[ ]:=
```
term1 = ((-ϵ0) * μ0) * D[Cross[ev, mv], t]
```

Out[ ]=
$$\left\{0, 0, -2\, \epsilon 0^{3/2} \sqrt{\mu 0}\, f[x, y]^2 g\left[t-\left(1+\frac{1}{z}\right) z \sqrt{\epsilon 0} \sqrt{\mu 0}\right] g'\left[t-\left(1+\frac{1}{z}\right) z \sqrt{\epsilon 0} \sqrt{\mu 0}\right]\right\}$$

In[ ]:=
$$\text{term 2} = \varepsilon_0\, \bar{E}\, (\nabla . \bar{E})$$

— ⋯ Div : $\nabla.\bar{E}$ cannot be interpreted. In a divergence, the del operator requires a subscript with

In[ ]:=
```
term2 = ϵ0 * ev * Div[ev]
```

Out[ ]=
$$\left\{\epsilon 0\, f[x, y]\, g\left[t-\left(1+\frac{1}{z}\right) z \sqrt{\epsilon 0} \sqrt{\mu 0}\right]^2 f^{(1,0)}[x, y], 0, 0\right\}$$

In[ ]:= $\text{term3} = -\varepsilon_0\, \overline{E} \times (\nabla \times \overline{E})$

— General : $\nabla \times \overline{E}$ cannot be interpreted. The prefix operator ∇ cannot be combined with the b

In[ ]:=
```
term3 = (-ϵ0) * Cross[ev, Curl[ev]]
```

Out[ ]= $\left\{0, -\epsilon 0\, f[x, y]\, g\left[t - \left(1 + \frac{1}{z}\right) z \sqrt{\epsilon 0} \sqrt{\mu 0}\right]^2 f^{(0,1)}[x, y], \epsilon 0^{3/2} \sqrt{\mu 0}\, f[x, y]^2 g\left[t - \left(1\right.\right.\right.$

In[ ]:= $\text{term4} = \mu_0\, \overline{H}\, (\nabla . \overline{H})$

— Div : $\nabla . \overline{H}$ cannot be interpreted. In a divergence, the del operator requires a subscript with c

In[ ]:=
```
term4 = μ0 * mv * Div[mv]
```

Out[ ]= $\left\{0, \epsilon 0\, f[x, y]\, g\left[t - \left(1 + \frac{1}{z}\right) z \sqrt{\epsilon 0} \sqrt{\mu 0}\right]^2 f^{(0,1)}[x, y], 0\right\}$

In[ ]:= $\text{term5} = -\mu_0\, \overline{H} \times (\nabla \times \overline{H})$

— General : $\nabla \times \overline{H}$ cannot be interpreted. The prefix operator ∇ cannot be combined with the b

In[ ]:=
```
term5 = (-μ0) * Cross[mv, Curl[mv]]
```

Out[ ]= $\left\{-\epsilon 0\, f[x, y]\, g\left[t - \left(1 + \frac{1}{z}\right) z \sqrt{\epsilon 0} \sqrt{\mu 0}\right]^2 f^{(1,0)}[x, y], 0, \epsilon 0^{3/2} \sqrt{\mu 0}\, f[x, y]^2 g\left[t - \left(1\right.\right.\right.$

In[ ]:=

$$-\frac{1}{c^2}\frac{\partial(\bar{E}\times\bar{H})}{\partial t}+\varepsilon_0\,\bar{E}\,(\nabla.\bar{E})-\varepsilon_0\,\bar{E}\times(\nabla\times\bar{E})+\mu_0\,\bar{H}\,(\nabla.\bar{H})-\mu_0\,\bar{H}\times(\nabla\times\bar{H})$$

Which can be written as :

$$\text{term1} = -\frac{1}{c^2}\frac{\partial(\bar{E}\times\bar{H})}{\partial t}$$

$$\text{term 2} = \varepsilon_0\,\bar{E}\,(\nabla.\bar{E})$$

$$\text{term3} = -\varepsilon_0\,\bar{E}\times(\nabla\times\bar{E})$$

$$\text{term4} = \mu_0\,\bar{H}\,(\nabla.\bar{H})$$

$$\text{term5} = -\mu_0\,\bar{H}\times(\nabla\times\bar{H})$$

Equation (19) equals :

$$\text{term1} + \text{term2} + \text{term3} + \text{term4} + \text{term5} = 0$$

— Div : ∇.Ē cannot be interpreted. In a divergence, the del operator requires a subscript with

In[ ]:=
```
vergelijking = term1 + term2 + term3 + term4 + term5
```
Out[ ]= {0, 0, 0}

In[ ]:=
```
The electromagnetic force density in the x – direction equals :
```

In[ ]:=
```
xvergelijking = term1[[1]] + term2[[1]] + term3[[1]] + term4[[1]] +
  term5[[1]]
```
Out[ ]= 0

In[ ]:=
```
FullSimplify[%]
```
Out[ ]= 0

In[ ]:=
```
xvergelijking1 = %
```
Out[ ]= 0

In[ ]:= The electromagnetic force density in the y – direction equals :

In[ ]:=
```
yvergelijking = term1⟦2⟧ + term2⟦2⟧ + term3⟦2⟧ + term4⟦2⟧ +
  term5⟦2⟧
```
Out[ ]= 0

In[ ]:=
```
FullSimplify[%]
```
Out[ ]= 0

In[ ]:=
```
yvergelijking1 = %
```
Out[ ]= 0

In[ ]:= The electromagnetic force density in the z – direction equals :

In[ ]:=
```
zvergelijking = term1⟦3⟧ + term2⟦3⟧ + term3⟦3⟧ + term4⟦3⟧ +
  term5⟦3⟧
```
Out[ ]= 0

In[ ]:=
```
FullSimplify[%]
```
Out[ ]= 0

In[ ]:=
```
zvergelijking1 = %
```
Out[ ]= 0

In[ ]:= Universal Harmony (Equilibrium)

Out[ ]= Equilibrium Harmony Universal

In[ ]:= There are 4 fundamental forces in the universe.
1. The expanding force : Radiation Pressure
2. The confing force : Electromagnetic Interaction
3. The confining force : Gravity (second order effect of the electromagnetic confinement)
4. The inertia of Energy ($W = m c^2$, Einstein)

Together, the 4 fundamental forces realize a Universal Equilibrium. In every direction, the algebraic su

The expanding force : 'The Electromagnetic Radiation Pressure' is an outward oriented electrom

$$\text{femrp} = -(\nabla w)$$

in which 'w' equals the electromagnetic energy density. The electromagnetic energy equals :

$$w = \left(\frac{\epsilon 0\, \mu 0^2}{2} \text{Dot[mv, mv]} + \frac{\epsilon 0^2\, \mu 0}{2} \text{Dot[ev, ev]}\right)$$

Out[ ]= 4 are expanding forces fundamental in the The There universe.1. (force : Pressure R

Out[ ]= 2. confing The (force : Electromagnetic Interaction)

Out[ ]= 3. confining The (force : confinement effect electromagnetic Gravity of order seco

In[ ]:= There are 4 fundamental forces in the universe.
1. The expanding force : Radiation Pressure
2. The confing force : Electromagnetic Interaction
3. The confining force : Gravity (second order effect of the electromagnetic confinement)
4. The inertia of Energy ($W = m c^2$, Einstein)

Together, the 4 fundamental forces realize a Universal Equilibrium. In every direction,
the algebraic sum of all the force densities together equals zero in any direction.

Out[ ]= 4 are expanding forces fundamental in the The There universe.1. (force : Pressure R

Out[ ]= 2. confing The (force : Electromagnetic Interaction)

Out[ ]= 3. confining The (force : confinement effect electromagnetic Gravity of order seco

In[ ]:= The expanding force : 'The Electromagnetic Radiation Pressure' is an outward oriented electromagneti

$$\text{RaditationEMRP} = -(\nabla w)$$

in which 'w' equals the electromagnetic energy density. The electromagnetic energy equals :

$$w = \left(\frac{\mu 0}{2} H^2 + \frac{\epsilon 0}{2} E^2\right)$$

In[ ]:= $w = \left(\frac{\mu 0}{2}\text{Dot[mv, mv]} + \frac{\epsilon 0}{2}\text{Dot[ev, ev]}\right)$

Out[ ]= $\epsilon 0\, f[x, y]^2\, g\left[t - \left(1 + \frac{1}{z}\right) z \sqrt{\epsilon 0} \sqrt{\mu 0}\right]^2$

In[ ]:= RaditationEMRP = − (∇ w)

Out[ ]= −∇W

In[ ]:= RaditationEMRP = − Grad[w]

Out[ ]= $\left\{-2\,\epsilon 0\, f[x, y]\, g\left[t - \left(1 + \frac{1}{z}\right) z \sqrt{\epsilon 0} \sqrt{\mu 0}\right]^2 f^{(1,0)}[x, y],\ -2\,\epsilon 0\, f[x, y]\, g\left[t - \left(1 + \frac{1}{z}\right) z\right.\right.$
$-2\,\epsilon 0 \left(-\left(\left(1 + \frac{1}{z}\right)\sqrt{\epsilon 0}\sqrt{\mu 0}\right) + \frac{\sqrt{\epsilon 0}\sqrt{\mu 0}}{z}\right) f[x, y]^2\, g\left[t - \left(1 + \frac{1}{z}\right) z \sqrt{\epsilon 0}\sqrt{\mu 0}\right] g'\left[t -\right.$

In[ ]:= Universal Harmony (Equilibrium) in the x − direction

Out[ ]= −direction + Equilibrium Harmony in the Universal x

In[ ]:= The example being used represents an electric field intensity ev in the x − direction, a magnetic field inte

The outward oriented Electromagnetic Radiation Pressure in the x −
direction (Book Page 153, Equation B − 12) will be compensated bij the confining ' Electromagnetic
direction. The outward oriented Electromagnetic Radiation Pressure RaditationEMRPx in the x − dire

In[ ]:= RaditationEMRP = − Grad[w]

Out[ ]= $\left\{-2\,\epsilon 0\, f[x, y]\, g\left[t - \left(1 + \frac{1}{z}\right) z \sqrt{\epsilon 0} \sqrt{\mu 0}\right]^2 f^{(1,0)}[x, y],\ -2\,\epsilon 0\, f[x, y]\, g\left[t - \left(1 + \frac{1}{z}\right) z\right.\right.$
$-2\,\epsilon 0 \left(-\left(\left(1 + \frac{1}{z}\right)\sqrt{\epsilon 0}\sqrt{\mu 0}\right) + \frac{\sqrt{\epsilon 0}\sqrt{\mu 0}}{z}\right) f[x, y]^2\, g\left[t - \left(1 + \frac{1}{z}\right) z \sqrt{\epsilon 0}\sqrt{\mu 0}\right] g'\left[t -\right.$

In[ ]:= RaditationEMRPx = − Grad[w][[1]]

Out[ ]= $-2\,\epsilon 0\, f[x, y]\, g\left[t - \left(1 + \frac{1}{z}\right) z \sqrt{\epsilon 0} \sqrt{\mu 0}\right]^2 f^{(1,0)}[x, y]$

In[ ]:= This outward oriented force density will be compensated by the inward oriented Electric ' Electromag
and the inward oriented Magnetic ' Electromagnetic Interaction Force Density' in the x – direction : (Bo

The inward oriented Electric ' Electromagnetic Interaction Force Density' in the x – direction (Book Page 153, Equation B – 11) equals :

$$\varepsilon_0 \bar{E} (\bar{\nabla} . E)$$

In[ ]:= ev

Out[ ]= $\left\{f[x, y] \times g\left[t - \left(1 + \frac{1}{z}\right) z \sqrt{\epsilon 0} \sqrt{\mu 0}\right], 0, 0\right\}$

In[ ]:= ElectricEIFDx = ϵ0 Div[ev] × ev [[1]]

Out[ ]= $\epsilon 0\, f[x, y]\, g\left[t - \left(1 + \frac{1}{z}\right) z \sqrt{\epsilon 0} \sqrt{\mu 0}\right]^2 f^{(1,0)}[x, y]$

In[ ]:= The inward oriented Magnetic ' Electromagnetic Interaction Force Density' in the x – direction (Book Page 154, Equation B – 15) equals :

$$-\mu_0 \bar{H} \times (\bar{\nabla} \times H)$$

Out[ ]= Electromagnetic Force in Interaction inward oriented the The Density′ Magnetic′

In[ ]:= MagneticEIFDx = (μ0) * Cross[mv, Curl[mv]][[1]]

Out[ ]= $\epsilon 0\, f[x, y]\, g\left[t - \left(1 + \frac{1}{z}\right) z \sqrt{\epsilon 0} \sqrt{\mu 0}\right]^2 f^{(1,0)}[x, y]$

In[ ]:= The total force density in the x – direction equals the outward oriented radiation pressure + the inward o

Out[ ]= densities electromagnetic forces interaction inward oriented the – direction equa

In[ ]:= TotalForceDensitydirectionx = RaditationEMRPx + ElectricEIFDx + MagneticEIFDx

Out[ ]= 0

In[ ]:= The total force density in the x – direction equals always zero, independent of the intensity division f[x,
This implies that for e.g. a projection of any arbitrary slide on a screen,
there does always exist a perfect equilibrium (Universal Harmony) in the x – direction.

In[ ]:= Universal Harmony (Equilibrium) in the y – direction

Out[ ]= -direction + Equilibrium Harmony in the Universal y

In[ ]:= The example being used represents an electric field intensity ev in the x – direction, a magnetic field inte

The outward oriented Electromagnetic Radiation Pressure in the y – direction (Book Page 153, Equation B – 12) will be compensated bij the confining ' Electromagnetic direction. The outward oriented Electromagnetic Radiation Pressure RaditationEMRPy in the y – dire

In[ ]:= RaditationEMRP = – Grad[w]

Out[ ]= $\left\{-2\,\epsilon 0\, f[x,y]\, g\left[t-\left(1+\frac{1}{z}\right) z \sqrt{\epsilon 0}\sqrt{\mu 0}\right]^2 f^{(1,0)}[x,y],\ -2\,\epsilon 0\, f[x,y]\, g\left[t-\left(1+\frac{1}{z}\right) z\right.\right.$

$-2\,\epsilon 0\left(-\left(\left(1+\frac{1}{z}\right)\sqrt{\epsilon 0}\sqrt{\mu 0}\right)+\frac{\sqrt{\epsilon 0}\sqrt{\mu 0}}{z}\right) f[x,y]^2 g\left[t-\left(1+\frac{1}{z}\right) z \sqrt{\epsilon 0}\sqrt{\mu 0}\right] g'\left[t-\right.$

In[ ]:= RaditationEMRPy = – Grad[w][[2]]

Out[ ]= $-2\,\epsilon 0\, f[x,y]\, g\left[t-\left(1+\frac{1}{z}\right) z \sqrt{\epsilon 0}\sqrt{\mu 0}\right]^2 f^{(0,1)}[x,y]$

In[ ]:= This outward oriented force density will be compensated by the inward oriented Electric ' Electromag and the inward oriented Magnetic ' Electromagnetic Interaction Force Density' in the y – direction : (Bo

The inward oriented Electric ' Electromagnetic Interaction Force Density' in the y – direction (Book Page 153, Equation B – 11) equals :

$$-\varepsilon_0 \bar{E} \times (\nabla \times \bar{E})$$

In[ ]:= ElectricEIFDy = (ϵ0) * Cross[ev, Curl[ev]][[2]]

Out[ ]= $\epsilon 0\, f[x,y]\, g\left[t-\left(1+\frac{1}{z}\right) z \sqrt{\epsilon 0}\sqrt{\mu 0}\right]^2 f^{(0,1)}[x,y]$

In[ ]:= The inward oriented Magnetic ' Electromagnetic Interaction Force Density' in the y – direction (Book Page 154, Equation B – 15) equals :

$$\mu_0 \bar{H} (\nabla . \bar{H})$$

Out[ ]= Electromagnetic Force in Interaction inward oriented the The Density′ Magnetic′

In[ ]:= MagneticEIFDy = $\mu 0$ Div[mv] × mv⟦2⟧

Out[ ]= $\epsilon 0\, f[x, y]\, g\left[t - \left(1 + \frac{1}{z}\right) z \sqrt{\epsilon 0} \sqrt{\mu 0}\right]^2 f^{(0,1)}[x, y]$

In[ ]:= The total force density in the y – direction equals the outward oriented radiation pressure in the y – direc

In[ ]:= TotalForceDensitydirectiony = RaditationEMRPy + ElectricEIFDy + MagneticEIFDy

Out[ ]= 0

In[ ]:= The total force density in the y – direction equals always zero, independent of the intensity division f[x,
This implies that for e.g. a projection of any arbitrary slide on a screen,
there does always exist a perfect equilibrium (Universal Harmony) in the y – direction.

In[ ]:= Universal Harmony (Equilibrium) in the z – direction

Out[ ]= -direction + Equilibrium Harmony in the Universal z

In[ ]:= The example being used represents an electric field intensity ev in the x – direction, a magnetic field inte

The outward oriented Electromagnetic Radiation Pressure in the z – direction (Book Page 153, Equation B – 12) cannot be compensated bij the confining ' Electromagne

There is no Electric Field Component and no Magnetic Field Component in the z – direction. For cannot be compensated by ' Electromagnetic (Electric and Magnetic) Interaction Force Densities'. The of Energy ($W = m c^2$, Einstein).

The outward oriented Electromagnetic Radiation Pressure RaditationEMRPz in the z – direction e

In[ ]:= RaditationEMRP = – Grad[w]

Out[ ]= $\left\{-2\, \epsilon 0\, f[x, y]\, g\left[t - \left(1 + \frac{1}{z}\right) z \sqrt{\epsilon 0} \sqrt{\mu 0}\right]^2 f^{(1,0)}[x, y],\ -2\, \epsilon 0\, f[x, y]\, g\left[t - \left(1 + \frac{1}{z}\right) z\right.\right.$

$-2\, \epsilon 0 \left(-\left(\left(1 + \frac{1}{z}\right) \sqrt{\epsilon 0} \sqrt{\mu 0}\right) + \frac{\sqrt{\epsilon 0} \sqrt{\mu 0}}{z}\right) f[x, y]^2\, g\left[t - \left(1 + \frac{1}{z}\right) z \sqrt{\epsilon 0} \sqrt{\mu 0}\right] g'\left[t - \right.$

In[ ]:= RaditationEMRPz = – Grad[w]⟦3⟧

Out[ ]= $-2\, \epsilon 0 \left(-\left(\left(1 + \frac{1}{z}\right) \sqrt{\epsilon 0} \sqrt{\mu 0}\right) + \frac{\sqrt{\epsilon 0} \sqrt{\mu 0}}{z}\right) f[x, y]^2\, g\left[t - \left(1 + \frac{1}{z}\right) z \sqrt{\epsilon 0} \sqrt{\mu 0}\right] g'\left[t - \left(\right.\right.$

In[ ]:= FullSimplify[%]

Out[ ]= $2\,\epsilon0^{3/2}\,\sqrt{\mu0}\,f[x,y]^2\,g\left[t-(1+z)\sqrt{\epsilon0}\sqrt{\mu0}\right]\,g'\left[t-(1+z)\sqrt{\epsilon0}\sqrt{\mu0}\right]$

In[ ]:= This outward (forward) oriented force density in the z – direction will be compensated by the,
in the negative direction of the z – axis oriented , 'Inertia Force Density' of Electromagnetic Energy (E

$$\text{EMInertiaz} = -\frac{1}{c^2}\frac{\partial(\bar{E}\times\bar{H})}{\partial t}$$

In[ ]:= EMInertiaz = (−ϵ0 * μ0) * D[Cross[ev, mv], t][[3]]

Out[ ]= $-2\,\epsilon0^{3/2}\,\sqrt{\mu0}\,f[x,y]^2\,g\left[t-\left(1+\frac{1}{z}\right)z\sqrt{\epsilon0}\sqrt{\mu0}\right]\,g'\left[t-\left(1+\frac{1}{z}\right)z\sqrt{\epsilon0}\sqrt{\mu0}\right]$

In[ ]:= The total force density in the z – direction equals the outward (forward) oriented radiation pressure in the

In[ ]:= TotalForceDensitydirectionz = RaditationEMRPz + EMInertiaz

Out[ ]= $-2\,\epsilon0\left(-\left(\left(1+\frac{1}{z}\right)\sqrt{\epsilon0}\sqrt{\mu0}\right)+\frac{\sqrt{\epsilon0}\sqrt{\mu0}}{z}\right)f[x,y]^2\,g\left[t-\left(1+\frac{1}{z}\right)z\sqrt{\epsilon0}\sqrt{\mu0}\right]\,g'\left[t-\left(1\right.\right.$

In[ ]:= FullSimplify[%]

Out[ ]= 0

In[ ]:= The total force density in the z – direction (the direction of propagation) always equals zero, independe
This implies that for e.g. a projection of any arbitrary slide on a screen, there does always exist a p

This perfect equilibrium (Universal Harmony) in the z – direction does only exist at one single p

The speed of light ' c'.

$$c = \frac{1}{\sqrt{\epsilon 0\, \mu 0}}$$

(1). This is the Universal Law in Physics. Only at exactly the s
(Perfect Equilibrium) between the radiation pressure and the

(2) The direction of propagation of a beam of light will alw
the magnetic field direction.

According the force-density equations in the x-direction, y-
equals zero in every direction. This Perfect Equilibrium does only
speed: $c = \frac{1}{\sqrt{\epsilon 0\, \mu 0}}$. This represents the solution for equation (B

Solutions in Spherical Coordinate System: Equations (10) and (11)
ev{,,} symbol for Electric Field Intensity Vector, mv{,,} symbol for Magnetic Field Intensity Vector
Run program by: Select All: then: (shift + return)

```
In[ ]:= ϵ0 =.

In[ ]:= μ0 =.

In[ ]:= r =.

In[ ]:= θ =.

In[ ]:= φ =.

In[ ]:= t =.

In[ ]:= f[r] = .

In[ ]:= InverseFunctions → True

Out[ ]= InverseFunctions → True
```

In[ ]:=
```
Needs["DifferentialEquations`NDSolveProblems`"]
```

In[ ]:=
```
Needs["DifferentialEquations`NDSolveUtilities`"]
```

— System`Utilities`HashTableAdd : -- Message text not found -- (Seconds) (System`Utilities`H

— CloudObject : Unable to authenticate with Wolfram Cloud server. Please try authenticating