$$g_{\mu\nu} = \begin{bmatrix} \left(1 - \frac{2GM}{rc^2}\right) & 0 & 0 & 0 \\ 0 & -\left(1 - \frac{2GM}{rc^2}\right)^{-1} & 0 & 0 \\ 0 & 0 & -r^2 & 0 \\ 0 & 0 & 0 & -r^2 \sin^2\theta \end{bmatrix}$$

Solutions of objects with angular momentum proved much more challenging to find, as

$$\mathrm{gxx} = -1\cdot\left(1 - 2\cdot\frac{m}{r}\right)^{-1}$$

$$\mathrm{gtt} = 1 - \frac{2\cdot m}{r}$$

$$c(r) = \sqrt{\frac{-\mathrm{gtt}}{\mathrm{gxx}}}$$

$$c(r) := \sqrt{\frac{1 - \frac{2\cdot m}{r}}{\left(1 - 2\cdot\frac{m}{r}\right)^{-1}}}$$

$$x^2 + y^2 = r^2$$

$$\mathrm{mzon} := 1.98\cdot 10^{30} \qquad G := 6.67\cdot 10^{-11} \qquad c := 3\cdot 10^{8} \qquad \mathrm{rzon} := 680\cdot 10^{6}$$

$$r = \sqrt{x^2 + y^2}$$

$$m := \frac{G}{c^2}\cdot \mathrm{mzon} \qquad m = 1.467\times 10^{3}$$

$$c1(x,y) := \sqrt{\frac{1 - \frac{2\cdot m}{\sqrt{x^2+y^2}}}{\left(1 - 2\cdot\frac{m}{\sqrt{x^2+y^2}}\right)^{-1}}}$$

$$c\left(0, 690\cdot 10^{1}\right) =$$

$$\sqrt{\frac{1 - \frac{2\cdot m}{\sqrt{x^2+y^2}}}{\left(1 - 2\cdot\frac{m}{\sqrt{x^2+y^2}}\right)^{-1}}}$$

$$-\frac{2\cdot m\cdot y\cdot\left(\frac{2\cdot m}{\sqrt{x^2+y^2}} - 1\right)}{\sqrt{\left(\frac{2\cdot m}{\sqrt{x^2+y^2}} - 1\right)^2}\cdot\left(x^2+y^2\right)^{\frac{3}{2}}}$$

$$\mathrm{dcdy}(x,y) := -\frac{2\cdot m\cdot y\cdot\left(\frac{2\cdot m}{\sqrt{x^2+y^2}} - 1\right)}{\sqrt{\left(\frac{2\cdot m}{\sqrt{x^2+y^2}} - 1\right)^2}\cdot\left(x^2+y^2\right)^{\frac{3}{2}}}$$

$$\mathrm{dcdy}\left(10, 10^{4}\right) = 2.934796\times 10^{-5}$$

$$\text{hoek1}(\text{horleng}, y) := \int_{\frac{-\text{horleng}}{2}}^{\frac{\text{horleng}}{2}} \text{dcdy}(x, y)\, dx$$

$$a := \text{hoek1}\left(680 \cdot 10^{8}, 680 \cdot 10^{6}\right)$$

$$a = 8.636 \times 10^{-6}$$

$$\text{arcsec}(a) := a \cdot 206265 \qquad \text{arcsec}(a) = 1.781360369325$$

nauwkeuriger berekening

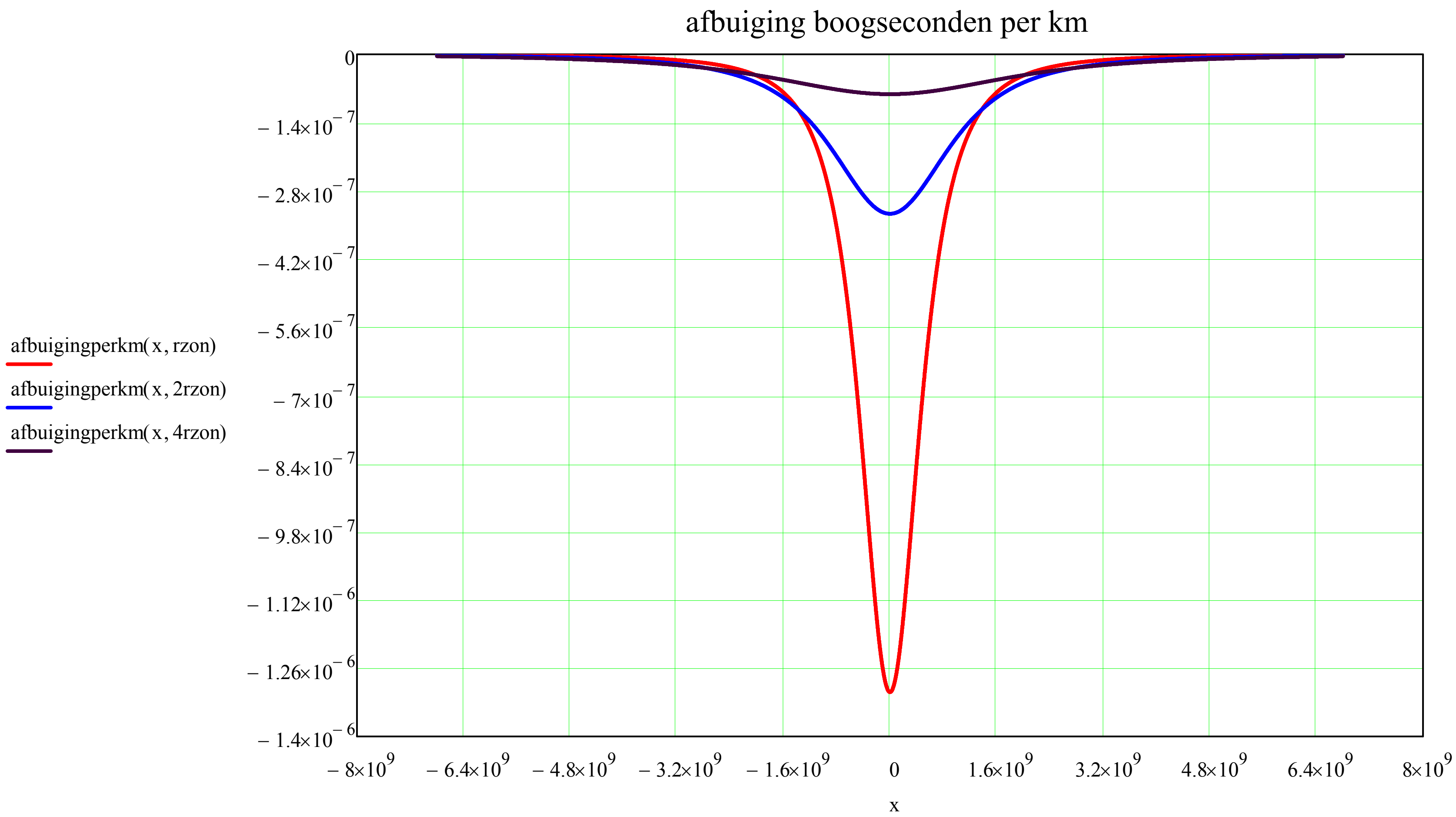
$$\text{hoek}(\text{horleng}, y) := \left| \begin{array}{l} \text{deltax} \leftarrow 1000000 \\ \text{som} \leftarrow 0 \\ \text{boogseconden\_rad} \leftarrow 206265 \\ x \leftarrow \frac{-\text{horleng}}{2} \\ \text{while } x < \frac{\text{horleng}}{2} \\ \quad \left| \begin{array}{l} \text{bijdrage} \leftarrow \text{dcdy}(x, y) \cdot \text{deltax} \cdot \text{boogseconden\_rad} \\ \text{som} \leftarrow \text{som} + \text{bijdrage} \\ x \leftarrow x + \text{deltax} \end{array} \right. \\ \text{som} \end{array} \right.$$

$$b := \text{hoek}\left(680 \cdot 10^{7}, 680 \cdot 10^{6}\right)$$

$$b = 1.745856$$

$$\text{afbuigingperkm}(x, y) := -\text{dcdy}(x, y) \cdot 1000 \cdot 206265$$

$$x := -10 \cdot \text{rzon}, -10 \cdot \text{rzon} + 100000 .. 10 \cdot \text{rzon}$$



$$c2(r) := \sqrt{1 - \frac{2 \cdot m}{r}}$$

$$r = \sqrt{x^2 + y^2}$$

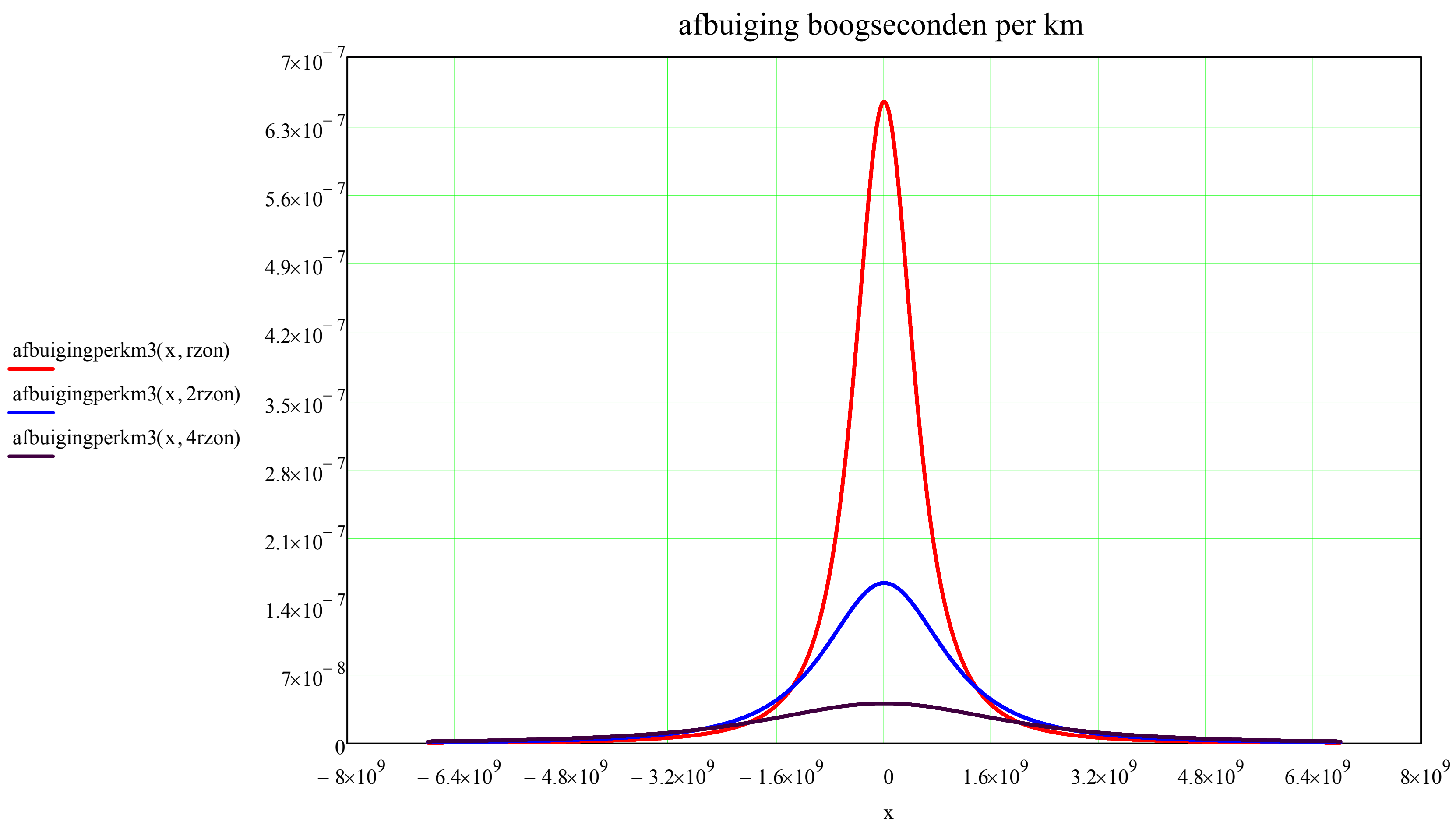
$$c3(x,y) := \sqrt{1 - \frac{2 \cdot m}{\sqrt{x^2 + y^2}}}$$

$$dcdy3(x,y) := \frac{m \cdot y}{\sqrt{1 - \frac{2 \cdot m}{\sqrt{x^2 + y^2}}} \cdot \left(x^2 + y^2\right)^{\frac{3}{2}}}$$

```
hoek3(horleng, y) := | deltax ← 1000000
                     | som ← 0
                     | boogseconden_rad ← 206265
                     | x ← −horleng / 2
                     | while  x < horleng / 2
                     |    | bijdrage ← dcdy3(x, y)·deltax·boogseconden_rad
                     |    | som ← som + bijdrage
                     |    | x ← x + deltax
                     | som
```

$afbuigingperkm3(x,y) := dcdy3(x,y) \cdot 1000 \cdot 206265$

$x := -10 \cdot rzon, -10 \cdot rzon + 100000 .. 10 \cdot rzon$



$b3 := hoek3\left(680 \cdot 10^7, 680 \cdot 10^6\right)$

$b3 = 0.87293$