https://nssdc.gsfc.nasa.gov/planetary/factsheet/mercuryfact.html

Bulk parameters

Mercury	Earth	Ratio (Mercury/Earth)
Mass (1024 kg)	0.33010	5.9722	0.0553
Volume (1010 km3)	6.083	108.321	0.0562
Equatorial radius (km)	2440.5	6378.1	0.383
Polar radius (km)	2438.3	6356.8	0.384
Volumetric mean radius (km)	2439.7	6371.0	0.383
Ellipticity (Flattening)	0.0009	0.00335	0.269
Mean density (kg/m3)	5429	5513	0.985
Surface gravity (mean) (m/s2)	3.70	9.82	0.378
Surface acceleration (eq.) (m/s2)	3.70	9.78	0.378
Surface acceleration (pole) (m/s2)	3.71	9.83	0.377
Escape velocity (km/s)	4.3	11.2	0.384
GM (x 106 km3/s2)	0.022032	0.39860	0.0553
Bond albedo	0.068	0.294	0.231
Geometric albedo	0.142	0.434	0.327
V-band magnitude V(1,0)	-0.613	-3.99	-
Solar irradiance (W/m2)	9082.7	1361.0	6.674
Black-body temperature (K)	439.6	254.0	1.731
Topographic range (km)	7	20	0.350
Moment of inertia (I/MR2)	0.35	0.3308	1.058
J2 (x 10-6)	50.3	1082.63	0.055
Number of natural satellites	0	1	
Planetary ring system	No	No	

Orbital parameters

Mercury	Earth	Ratio (Mercury/Earth)
Semimajor axis (106 km)	57.909	149.598	0.387
Sidereal orbit period (days)	87.969	365.256	0.241
Tropical orbit period (days)	87.968	365.242	0.241
Perihelion (106 km)	46.000	147.095	0.313
Aphelion (106 km)	69.818	152.100	0.459
Synodic period (days)	115.88	-	-
Mean orbital velocity (km/s)	47.36	29.78	1.590
Max. orbital velocity (km/s)	58.97	30.29	1.947
Min. orbital velocity (km/s)	38.86	29.29	1.327
Orbit inclination (deg)	7.004	0.000	-
Orbit eccentricity	0.2056	0.0167	12.311
Sidereal rotation period (hrs)	1407.6	23.9345	58.785

Length of day (hrs)	4222.6	24.0000	175.942
Obliquity to orbit (deg)	0.034	23.44	0.001
Inclination of equator (deg)	0.034	23.44	0.001

gemiddelde afstand tot de zon: 0,3871 A.E. (57,909 milj. km)
kleinste afstand tot de zon: 0,3075 A.E. (46,001 milj. km)
grootste afstand tot de zon: 0,4667 A.E. (69,817 milj. km)
siderische omlooptijd: 0,2408518 jaar
synodische periode: 115,877 dagen
baansnelheid: 47,872 km/sec

$u := 10^{-6}$ $n := 10^{-9}$ $c := 2.998 \cdot 10^{8}$ $k := 1000$

$Fz(M1, M2, r) := \left| Gc \leftarrow 6.67 \cdot 10^{-11} \right.$
$\left. \frac{Gc \cdot M1 \cdot M2}{r^2} \right.$

$rondjes := 10$
aantal rondjes van mercurius

$miljoen := 10^{6}$

$87.968 \cdot 24 \cdot 3600 = 7.6 \times 10^{6}$ seconden per omwenteling mercurius

$a1 := 0.1$ $dt := 3600 \cdot a1$

$nmax := 87.968 \cdot \frac{24}{a1} \cdot rondjes$ $k := 1000$ $schaling := 1$

$M1 := 1.989 \cdot 10^{30}$ $M2 := 0.33010 \cdot 10^{24}$

$km := 1000$ $Gc := 6.67 \cdot 10^{-11}$ $88 \cdot 24 \cdot 60 \cdot 60 = 7.603 \times 10^{3} \cdot k$

$$\text{pos}(M1, vx1, vy1, x1, y1, M2, vx2, vy2, x2, y2, dt) :=$$

$c \leftarrow 2.998 \cdot 10^8$

$r \leftarrow \sqrt{\left[(x1 - x2)^2 + (y1 - y2)^2\right]}$

$r\_richting \leftarrow \begin{pmatrix} x1 - x2 \\ y1 - y2 \end{pmatrix} \cdot \frac{1}{\sqrt{(x1 - x2)^2 + (y1 - y2)^2}}$

$v \leftarrow \begin{pmatrix} vx2 \\ vy2 \end{pmatrix}$

v mwercurius

v_r is snelheid in r richting is inproduct van v en v_r

$v\_r \leftarrow -v \cdot r\_richting$

$corr \leftarrow 1 + \frac{v\_r}{c} \cdot schaling$

$(F1 \leftarrow Fz(M1, M2, r) \cdot corr) \quad \text{if} \quad vx1 < 0$

$\left(\left(F1 \leftarrow Fz(M1, M2, r) \cdot \frac{1}{corr}\right)\right) \quad \text{otherwise}$

$a1 \leftarrow \frac{-F1}{M1}$

$a2 \leftarrow \frac{F1}{M2}$

$a1x \leftarrow \frac{a1 \cdot (x1 - x2)}{r}$

$a1y \leftarrow \frac{a1 \cdot (y1 - y2)}{r}$

$a2x \leftarrow \frac{a2 \cdot (x1 - x2)}{r}$

$a2y \leftarrow \frac{a2 \cdot (y1 - y2)}{r}$

$vx1 \leftarrow vx1 + a1x \cdot dt$

$vy1 \leftarrow vy1 + a1y \cdot dt$

$vx2 \leftarrow vx2 + a2x \cdot dt$

$vy2 \leftarrow vy2 + a2y \cdot dt$

$dy1 \leftarrow vy1 \cdot dt$

$dx1 \leftarrow vx1 \cdot dt$

$dx2 \leftarrow vx2 \cdot dt$

$dy2 \leftarrow vy2 \cdot dt$

$x1 \leftarrow x1 + dx1$

$y1 \leftarrow y1 + dy1$

$x2 \leftarrow x2 + dx2$

$y2 \leftarrow y2 + dy2$

$posl_0 \leftarrow x1$

$posl_1 \leftarrow y1$

$posl_2 \leftarrow x2$

$posl_3 \leftarrow y2$

$posl_4 \leftarrow vx1$

$posl_5 \leftarrow vy1$

$posl_6 \leftarrow vx2$

$posl_7 \leftarrow vy2$

$posl_8 \leftarrow corr$

$posl$

```
xy := | n ← 0
      | v1 ← −(58.97k)·M2/M1
      | v2 ← 58.97k
      | vx1 ← 0
      | vy1 ← v1
      | vx2 ← 0
      | vy2 ← v2
      | x1 ← 46.001k·k·k
      | y1 ← 0
      | x2 ← 0
      | y2 ← 0
      | for n ∈ 0, 1 .. nmax
      |   | a ← pos(M1, vx1, vy1, x1, y1, M2, vx2, vy2, x2, y2, dt)
      |   | xy_{n,0} ← a_0
      |   | xy_{n,1} ← a_1
      |   | xy_{n,2} ← a_2
      |   | xy_{n,3} ← a_3
      |   | xy_{n,4} ← a_4
      |   | xy_{n,5} ← a_5
      |   | xy_{n,6} ← a_6
      |   | xy_{n,7} ← a_7
      |   | xy_{n,8} ← a_8
      |   | vx1 ← a_4
      |   | vy1 ← a_5
      |   | x1 ← a_0
      |   | y1 ← a_1
      |   | vx2 ← a_6
      |   | vy2 ← a_7
      |   | x2 ← a_2
      |   | y2 ← a_3
      | xy
```

$xy_{0,0} = 4.6 \times 10^{10}$

$n1 := 0, 1 .. nmax$

$\frac{365}{88} \cdot 100 = 414.773$ omlopen per eeuw

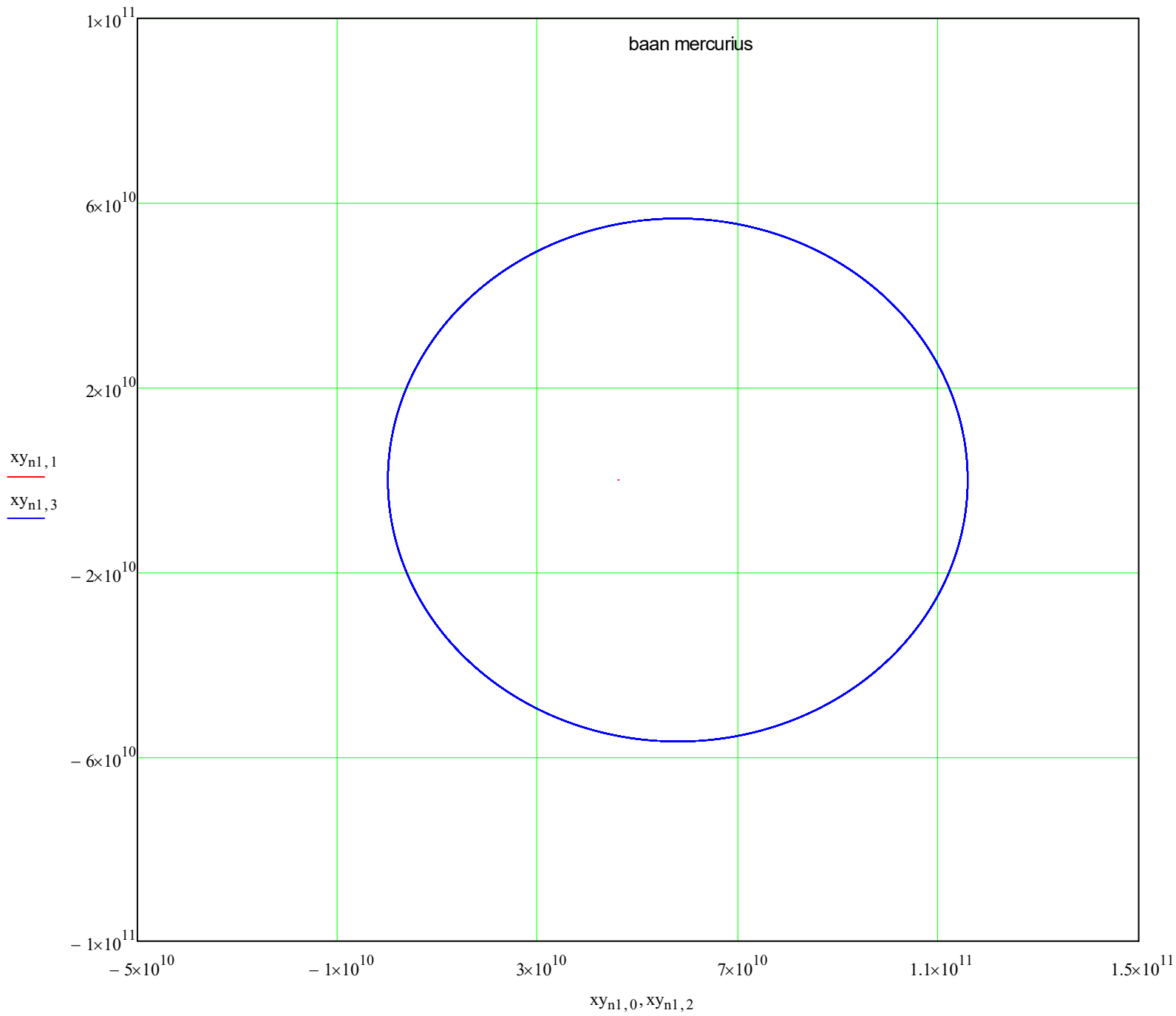
$2.0375e+007 - 1322.9 = 2.037 \times 10^{7}$

$k := 1000$

$1.4805e+008 - 1.2694e+008 = 2.111 \times 10^{7}$

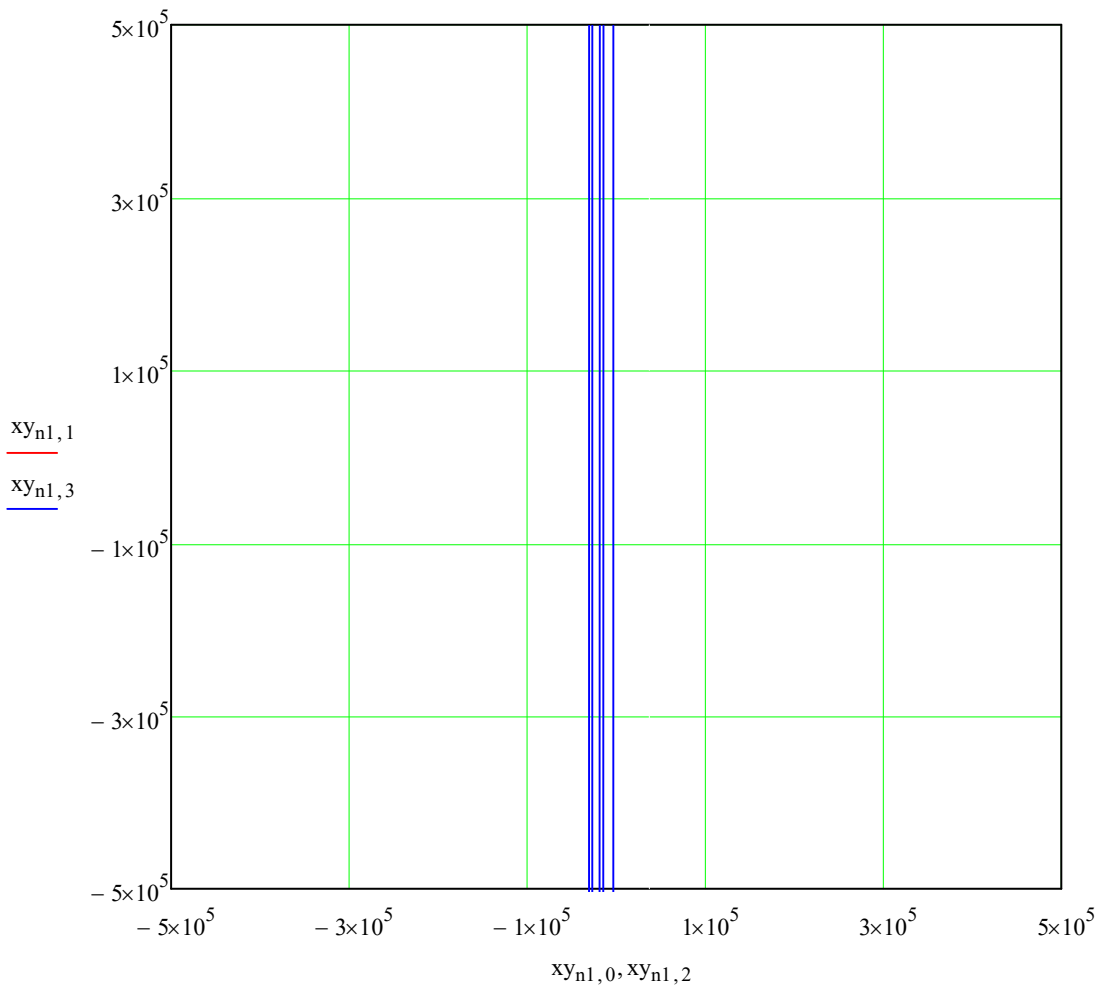
$\frac{574}{60 \cdot 60} = 0.159$ graden per eeuw

$\frac{1.4805e+008 - 1.2694e+008}{7e+010} \cdot 3600 = 1.086$

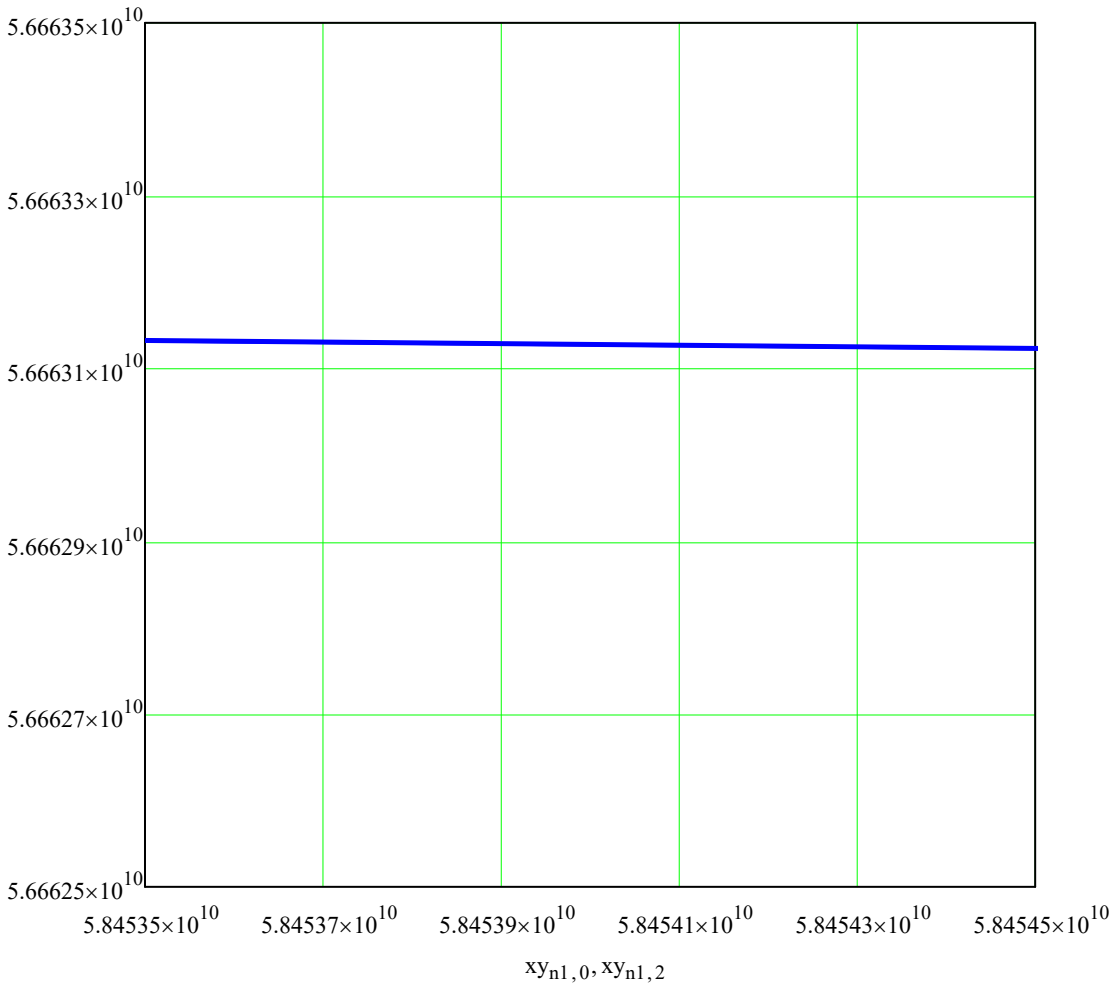


xo := 5.7807e+010 xl := 0 xb := 5.8454e+010 xr := 0

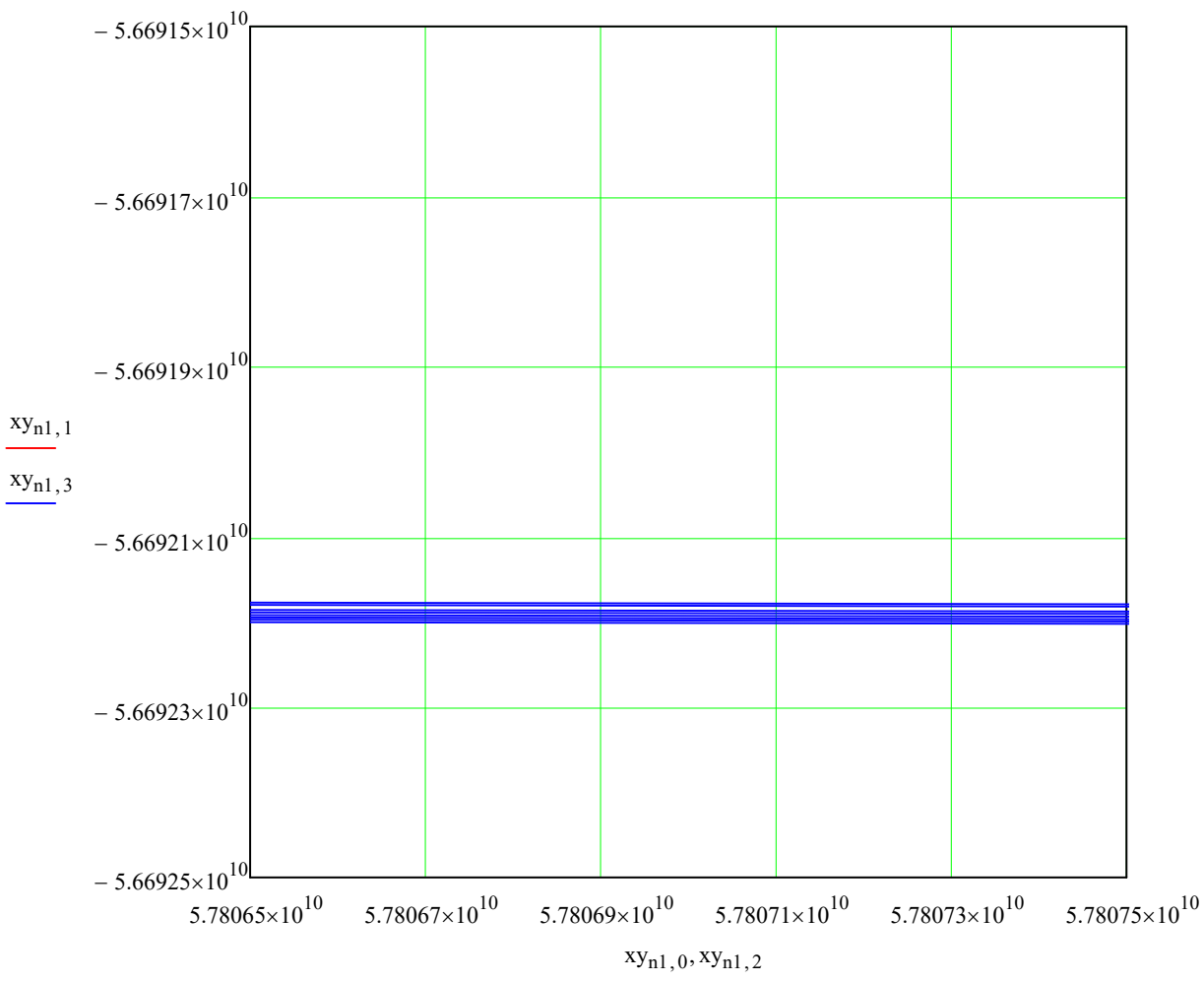
yo := −5.6692e+010 yl := 0 yb := 5.6663e+010 yr := 0



links

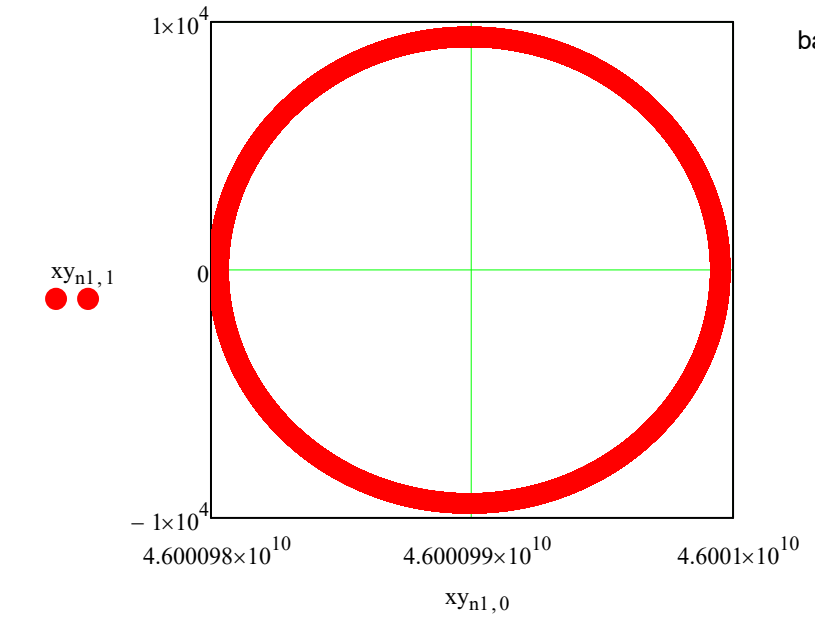


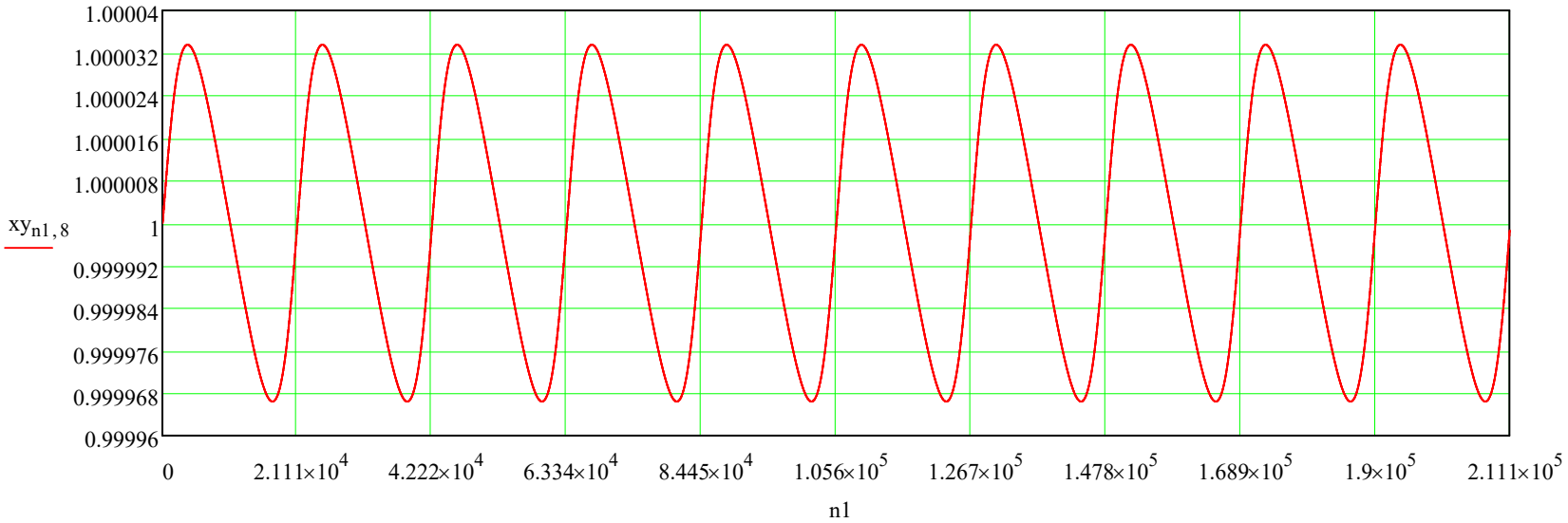
boven



onder

$$mid := \left(4.6001 \cdot 10^{7} - 9.5\right)km$$





$n := 0, 1 .. 20$

y coordinaat zon verandering

$xy_{n+1,1} - xy_{n,1} =$

-3.523
-3.523
-3.523
-3.523

x coordinaat zon verandering

$xy_{n+1,0} - xy_{n,0} =$

$-2.693 \cdot 10^{-3}$
$-4.044 \cdot 10^{-3}$
$-5.394 \cdot 10^{-3}$
$-6.744 \cdot 10^{-3}$

y coordinaat mercurius verandering

$xy_{n+1,3} - xy_{n,1} =$

$4.246 \cdot 10^{7}$
$6.369 \cdot 10^{7}$
$8.492 \cdot 10^{7}$

y coordinaat mercurius verandering

$xy_{n+1,2} - xy_{n,0} =$

$-4.6 \cdot 10^{10}$
$-4.6 \cdot 10^{10}$
$-4.6 \cdot 10^{10}$

-3.523	$-8.087 \cdot 10^{-3}$	$1.061 \cdot 10^{8}$	$-4.6 \cdot 10^{10}$
-3.523	$-9.438 \cdot 10^{-3}$	$1.274 \cdot 10^{8}$	$-4.6 \cdot 10^{10}$
-3.523	-0.011	$1.486 \cdot 10^{8}$	$-4.6 \cdot 10^{10}$
-3.523	-0.012	$1.698 \cdot 10^{8}$	$-4.6 \cdot 10^{10}$
-3.523	-0.013	$1.911 \cdot 10^{8}$	$-4.6 \cdot 10^{10}$
-3.523	-0.015	$2.123 \cdot 10^{8}$	$-4.6 \cdot 10^{10}$
-3.523	-0.016	$2.335 \cdot 10^{8}$	$-4.6 \cdot 10^{10}$
-3.523	-0.018	$2.547 \cdot 10^{8}$	$-4.6 \cdot 10^{10}$
-3.523	-0.019	$2.76 \cdot 10^{8}$	$-4.6 \cdot 10^{10}$
-3.523	-0.02	$2.972 \cdot 10^{8}$	$-4.6 \cdot 10^{10}$
-3.523	-0.022	$3.184 \cdot 10^{8}$	$-4.6 \cdot 10^{10}$
-3.523	-0.023	$3.397 \cdot 10^{8}$	$-4.6 \cdot 10^{10}$
...	...	...	...