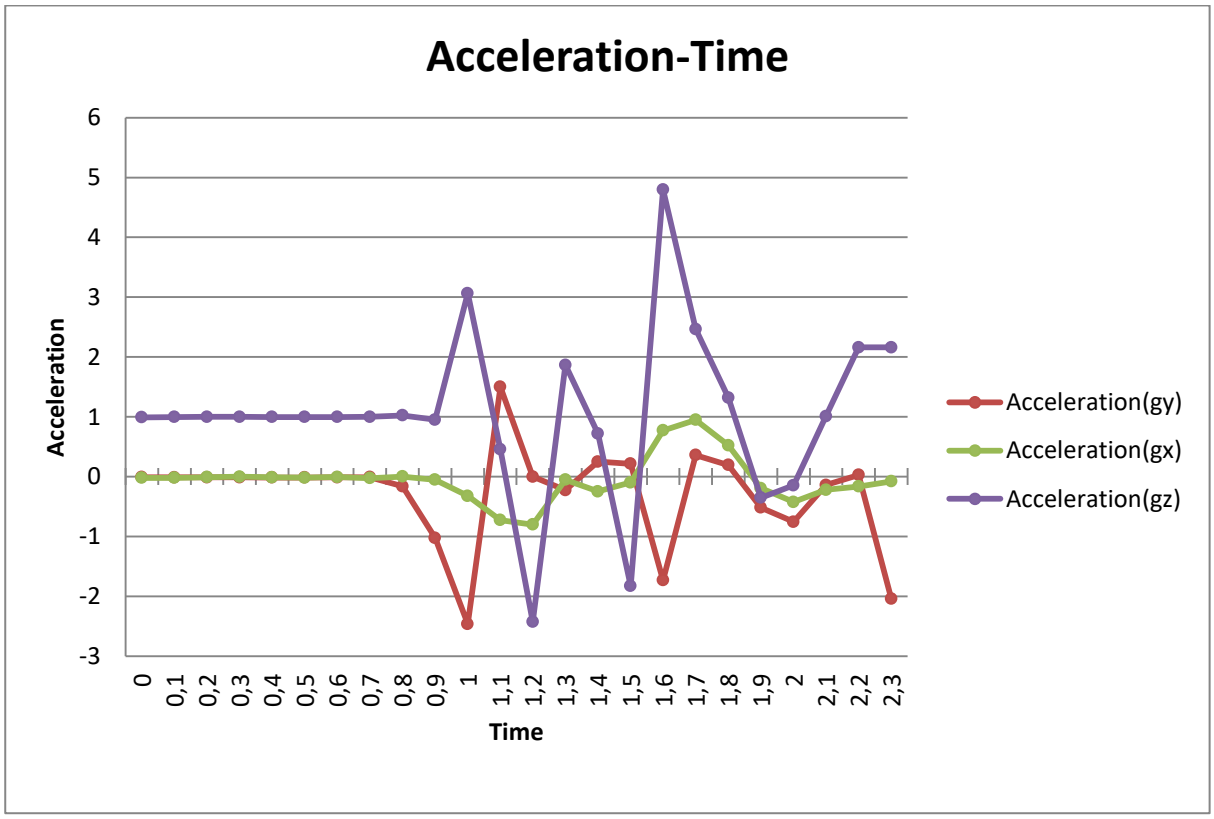
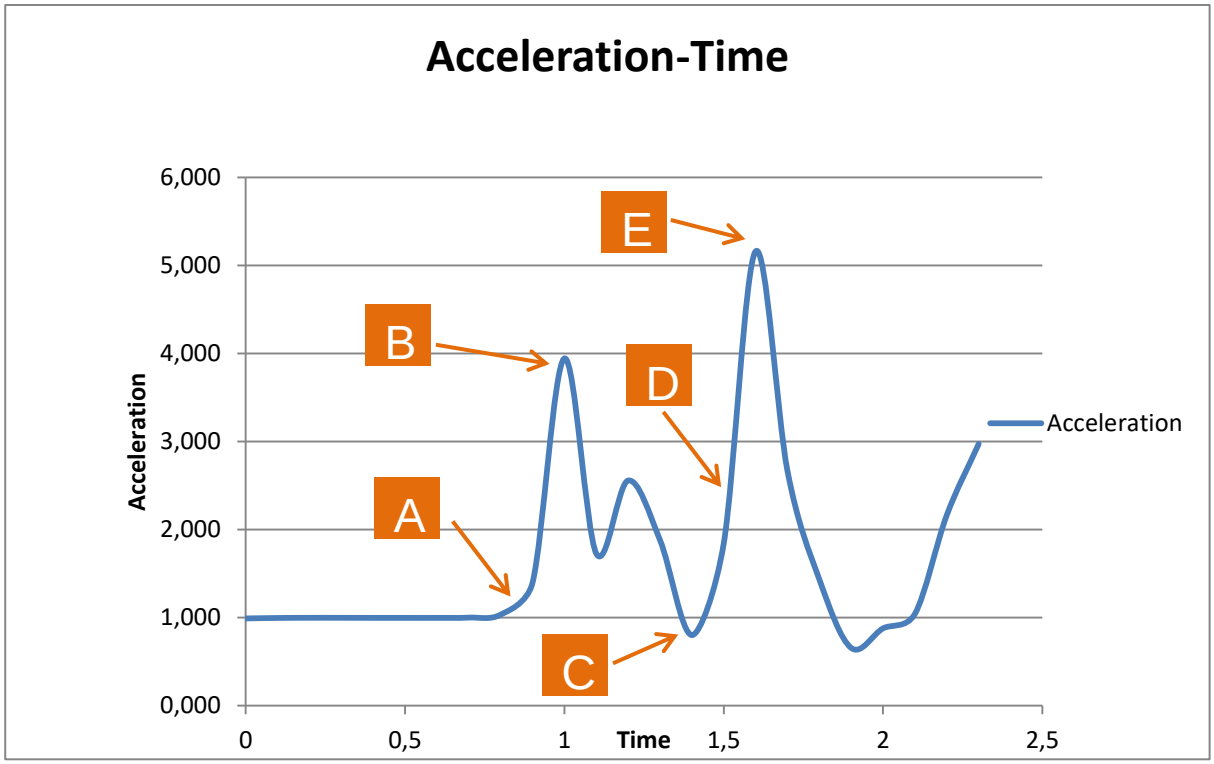
Time	Acceleration(gy)	Acceleration(gx)	Acceleration(gz)	Acceleration
0	-0,01	-0,02	0,991	0,991
0,1	-0,013	-0,021	0,996	0,996
0,2	-0,012	-0,011	0,998	0,998
0,3	-0,012	-0,001	0,998	0,998
0,4	-0,014	-0,013	0,997	0,997
0,5	-0,014	-0,019	0,997	0,997
0,6	-0,013	-0,007	0,997	0,997
0,7	-0,01	-0,026	1	1,000
0,8	-0,161	0	1,022	1,035
0,9	-1,023	-0,053	0,95	1,397
1	-2,462	-0,323	3,065	3,945
1,1	1,5	-0,726	0,456	1,728
1,2	-0,001	-0,803	-2,428	2,557
1,3	-0,227	-0,052	1,866	1,880
1,4	0,251	-0,249	0,719	0,801
1,5	0,216	-0,099	-1,828	1,843
1,6	-1,734	0,772	4,799	5,161
1,7	0,359	0,949	2,465	2,666
1,8	0,193	0,522	1,321	1,433
1,9	-0,517	-0,195	-0,353	0,656
2	-0,755	-0,425	-0,147	0,879
2,1	-0,141	-0,221	1,01	1,043
2,2	0,027	-0,165	2,159	2,165
2,3	-2,04	-0,079	2,161	2,973

ISPEED





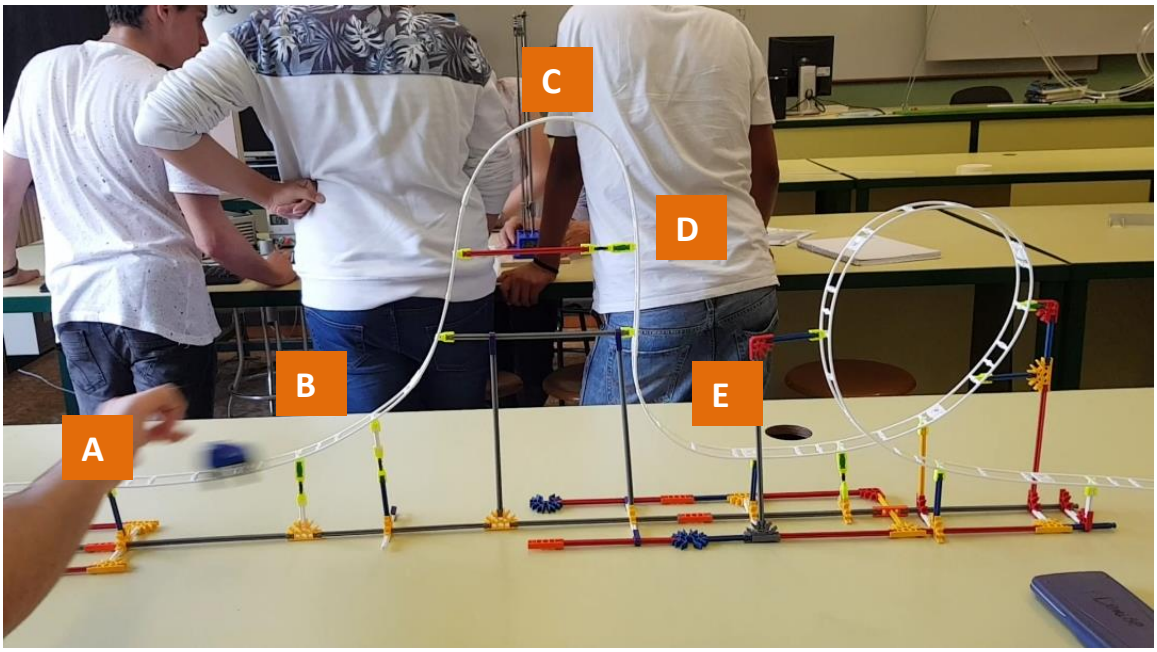
A: First Acceleration

B: Beginning of the first climb

C: Highest point

D: During the slope with an inclination of 90°

E: At the end of the slope



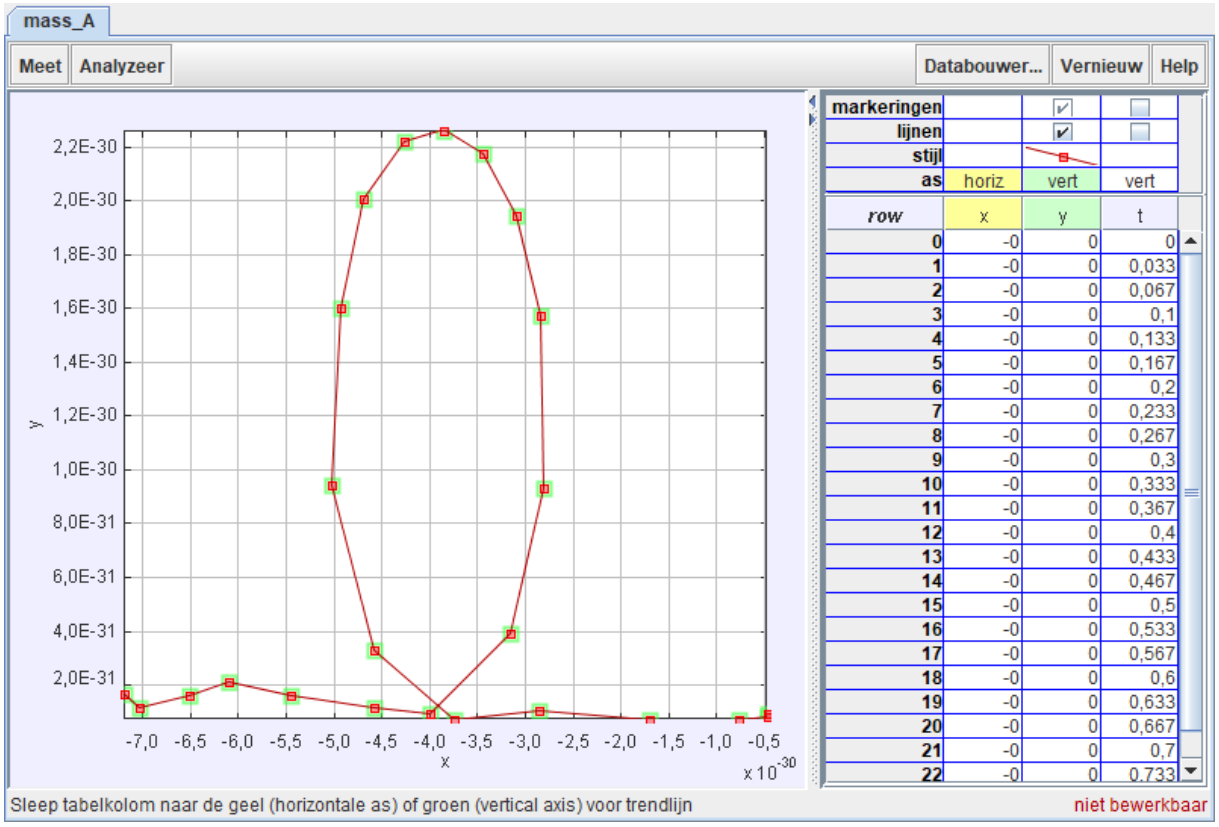
Our model.

All the graphics were made thanks to an electronic sensor placed on top of the trolley that moved along the model.

THE COBRA ATTRACTION

Given:

y(x)= graph + table (t,x)



y start (t)= 9,557^-32

y start (t)= 2,177^-30

y start (t)= 1,699^-31

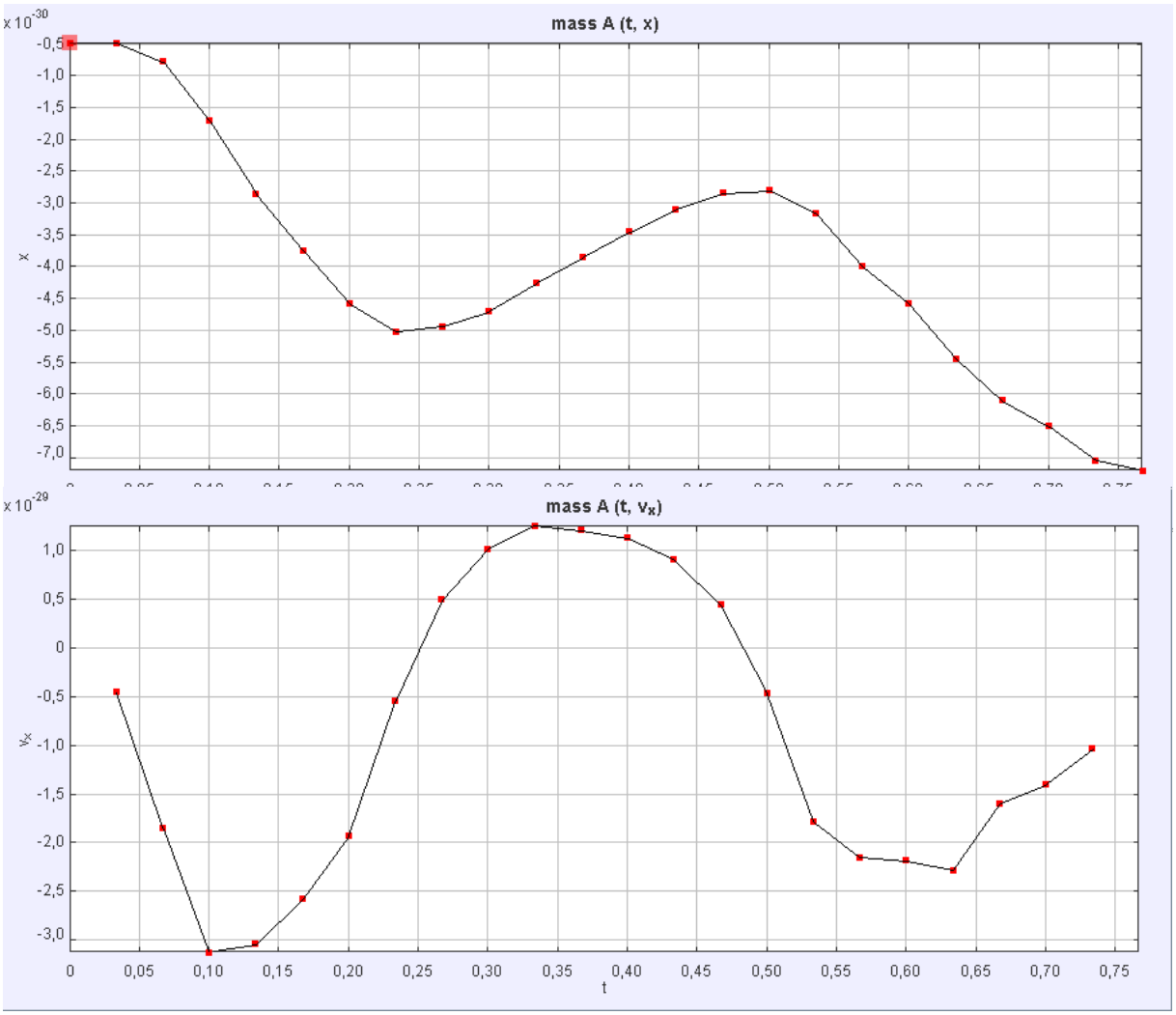
m_{car}= 0.025kg

h_{start}=h_{end}= 0,01m

$h_{looping}$= 0,28 m

Graphs:

X(t):



t	x	y
0,000	-4,779E-31	9,557E-32
0,033	-4,779E-31	8,495E-32
0,067	-7,752E-31	7,433E-32
0,100	-1,710E-30	7,433E-32
0,133	-2,857E-30	1,062E-31
0,167	-3,738E-30	7,433E-32
0,200	-4,577E-30	3,292E-31
0,233	-5,023E-30	9,451E-31
0,267	-4,938E-30	1,604E-30
0,300	-4,694E-30	2,007E-30
0,333	-4,258E-30	2,219E-30
0,367	-3,855E-30	2,262E-30
0,400	-3,451E-30	2,177E-30
0,433	-3,101E-30	1,943E-30
0,467	-2,846E-30	1,572E-30
0,500	-2,803E-30	9,345E-31
0,533	-3,154E-30	3,929E-31
0,567	-3,993E-30	9,557E-32
0,600	-4,588E-30	1,168E-31
0,633	-5,448E-30	1,593E-31
0,667	-6,106E-30	2,124E-31
0,700	-6,510E-30	1,593E-31
0,733	-7,041E-30	1,168E-31
0,767	-7,200E-30	1,699E-31

t	v_x
0,100	-3,122E-29
0,133	-3,042E-29
0,167	-2,580E-29
0,633	-2,278E-29
0,600	-2,182E-29
0,567	-2,150E-29
0,200	-1,927E-29
0,067	-1,848E-29
0,533	-1,784E-29
0,667	-1,593E-29
0,700	-1,402E-29
0,733	-1,035E-29
0,233	-5,416E-30
0,500	-4,619E-30
0,033	-4,460E-30
0,467	4,460E-30
0,267	4,938E-30
0,433	9,079E-30
0,300	1,019E-29
0,400	1,131E-29
0,367	1,211E-29
0,333	1,258E-29

Calculations:

$v_x(t)$
$v_y(t)$

$v = \sqrt{vx2 + vy2}$

$v_{start}(t)$= (t= 0.100) = $\sqrt{-3.12E-29^2 + (-4.78E-31)^2}$ = 3.12 E -29 m/s

v_{end} (t)= (t= 0.700)= $\sqrt{-1.40E-29^2 + (-1.43E-30)^2}$ = 1.41 E-29 m/s

v_{middle} (t)= (t= 0.200)= $\sqrt{-1.93E-29^2 + (1.39E-29)^2}$ = 2.38 E -29 m/s

➔ $E_k = ½m \cdot v^2$ (J/kg)

(at the beginning, in the middle and at the end)

$E_{k,start}$ = ½ o.025 x (3.12 E -29)^2 = 1.22 E -59 J

$E_{k,end}$= ½ 0.025 x (1.41 E -29)^2 = 2.49 E -59 J

$E_{k,middle}$ = ½ 0.025 x (2.38 E -29)^2 = 7.08 E -59 J

y(t) → E_{pot} = m x g x h (J/kg) (at the start, in the middle and at the end)

$E_{pot,start}$ = 0.025 x 9,81 x 0,01

= 0.0025 J

$E_{pot,\ middle}$= 0.025 x 9,81 x 0,28= 0.069 J

$h_{start} = h_{end}$= 0.01m en m_{car}= 25 => $E_{pot,start} = E_{pot,\ end}$

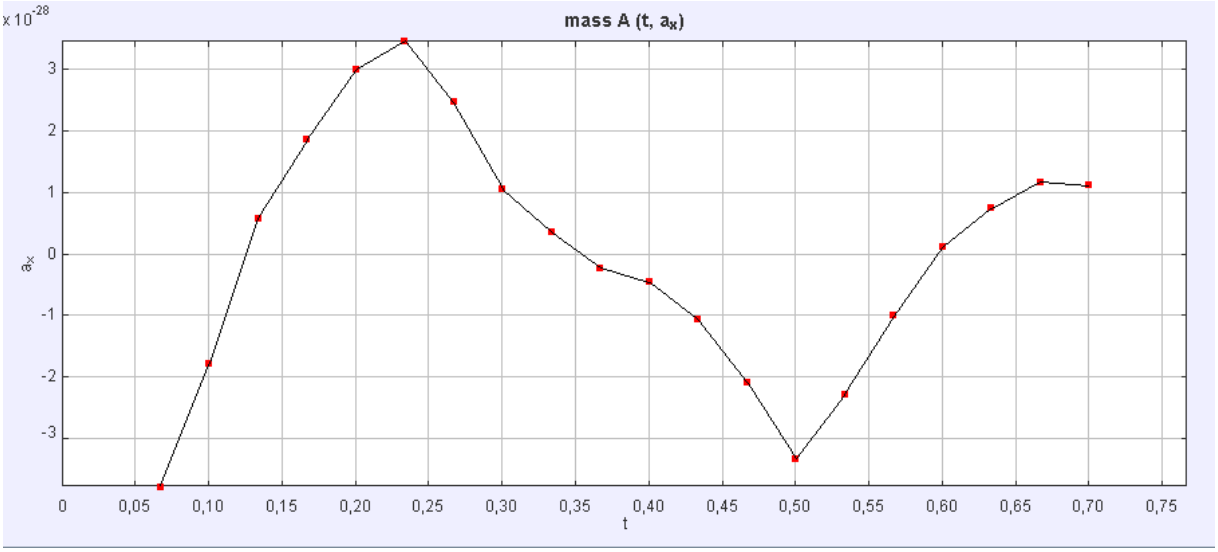
$E_{mech} = E_{pot} + E_k$

$E_{mech,start}$ = 0.0025 + 1.22 E -59= 0.0025 J

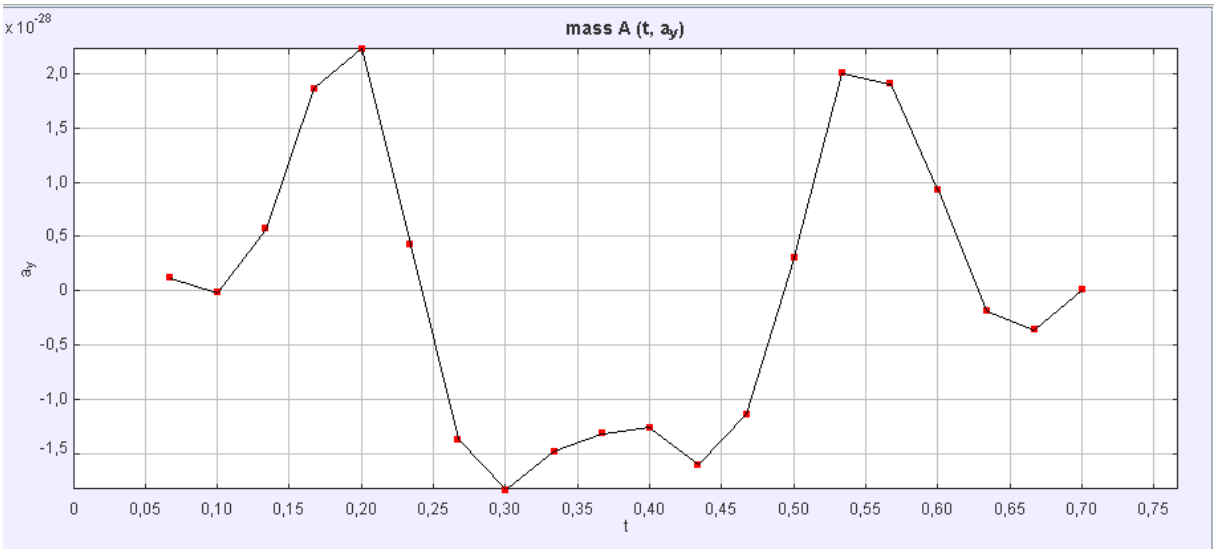
$E_{mech,middle}$= 0.069 + 7.08 E -59= 0.069 J

$E_{mech,end}$ = 0.025 + 2.49 E -59= 0.025 J

Graphs:



t	a_x
0,100	-1,775E-28
0,133	5,871E-29
0,167	1,857E-28
0,633	7,509E-29
0,600	1,229E-29
0,567	-9,967E-29
0,200	2,990E-28
0,067	-3,768E-28
0,533	-2,266E-28
0,667	1,174E-28
0,700	1,120E-28
0,733	
0,233	3,468E-28
0,500	-3,318E-28
0,033	
0,467	-2,075E-28
0,267	2,471E-28
0,433	-1,051E-28
0,300	1,065E-28
0,400	-4,506E-29
0,367	-2,185E-29
0,333	3,686E-29



t	a_y
0,100	-1,365E-30
0,133	5,734E-29
0,167	1,871E-28
0,633	-1,775E-29
0,600	9,284E-29
0,567	1,911E-28
0,200	2,239E-28
0,067	1,229E-29
0,533	2,007E-28
0,667	-3,550E-29
0,700	1,365E-30
0,733	
0,233	4,369E-29
0,500	3,140E-29
0,033	
0,467	-1,133E-28
0,267	-1,365E-28
0,433	-1,597E-28
0,300	-1,830E-28
0,400	-1,256E-28
0,367	-1,311E-28
0,333	-1,475E-28

Calculations:

$a_x(t)$

$a_y(t)$

$a = \sqrt{ax2 + ay2}$

$a_{start}(t)$=(t=0.100) $\sqrt{-1.78\text{E}-28^2 + (-1.37\text{E}-30)^2}$ = 1.78 E -28 m/s^2

$a_{end}(t)$= (t= 0.700) = $\sqrt{1.12\ \text{E}-28^2 + (1.37\text{E}-30)^2}$ = 1.12 E -28 m/s^2

$a_{middle}(t)$= (t= 0.200)= $\sqrt{2.99\text{E}-28^2 + (2.24\text{E}-28)^2}$ = 3.74 E -28 m/s^2

	E_k	E_{pot}	E_{mech}
beginning	1.22 E -59 J	0.0025 J	0.0025 J
middle	7.08 E -59 J	0.069 J	0.069 J
ending	2.49 E -59 J	0.0025 J	0.025 J

All the energy increases and then decreases. We see that our scalemodel goes from a high point to a lower one and then again to a high one.