# Movimiento de satelite debido a potencial de MacCullagh

Tabare Gallardo, setiembre 2005

```
G := 1.
M := 1.
A := 0.01
B := 0.015
CC := 0.02
```

$$V := -\frac{G}{r}\left(M + \frac{(A + B + CC - 3\,II)}{2\,r^2}\right)$$

$$V1 := V\ /.\ \left\{II \to \frac{A\,x^2 + B\,y^2 + CC\,z^2}{r^2}\right\}$$

$$V2 := V1\ /.\ \left\{r \to \sqrt{x^2 + y^2 + z^2}\right\}$$

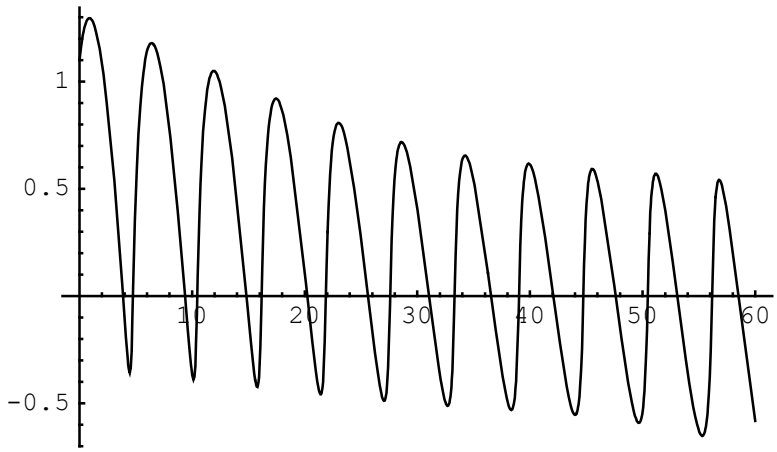
$$acelx := -\partial_x\, V2$$

$$acely := -\partial_y\, V2$$

$$acelz := -\partial_z\, V2$$

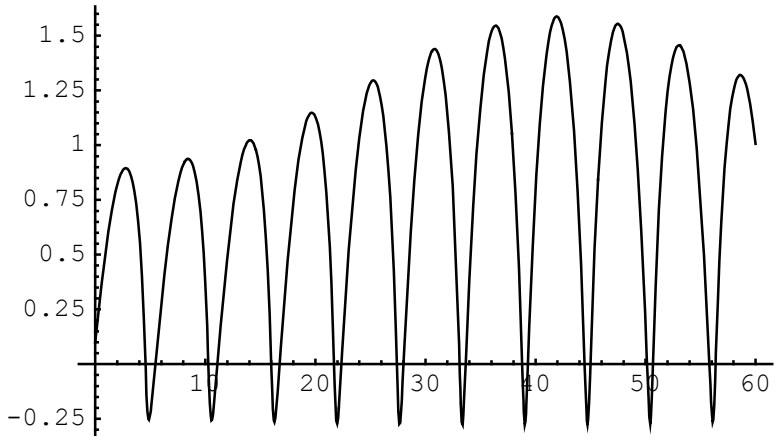
```
eqxt := acelx /. {y → y[t], x → x[t], z → z[t]}
eqyt := acely /. {y → y[t], x → x[t], z → z[t]}
eqzt := acelz /. {y → y[t], x → x[t], z → z[t]}
tfinal := 60.0
condini := {x[0] == 1.1, y[0] == 0.1, z[0] == 0.1, x'[0] == 0.5,
  y'[0] == 0.5, z'[0] == 0.5}
solution :=
 NDSolve[{x''[t] == eqxt, y''[t] == eqyt, z''[t] == eqzt, condini},
  {x, y, z}, {t, 0, tfinal}]
```

```
Plot[Evaluate[x[t] /. solution], {t, 0, tfinal}]
```




```
- Graphics -
```

```
Plot[Evaluate[y[t] /. solution], {t, 0, tfinal}]
```




```
- Graphics -
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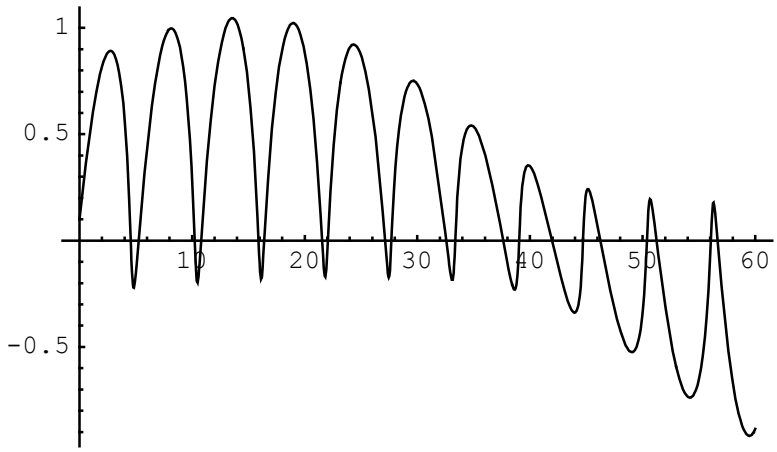
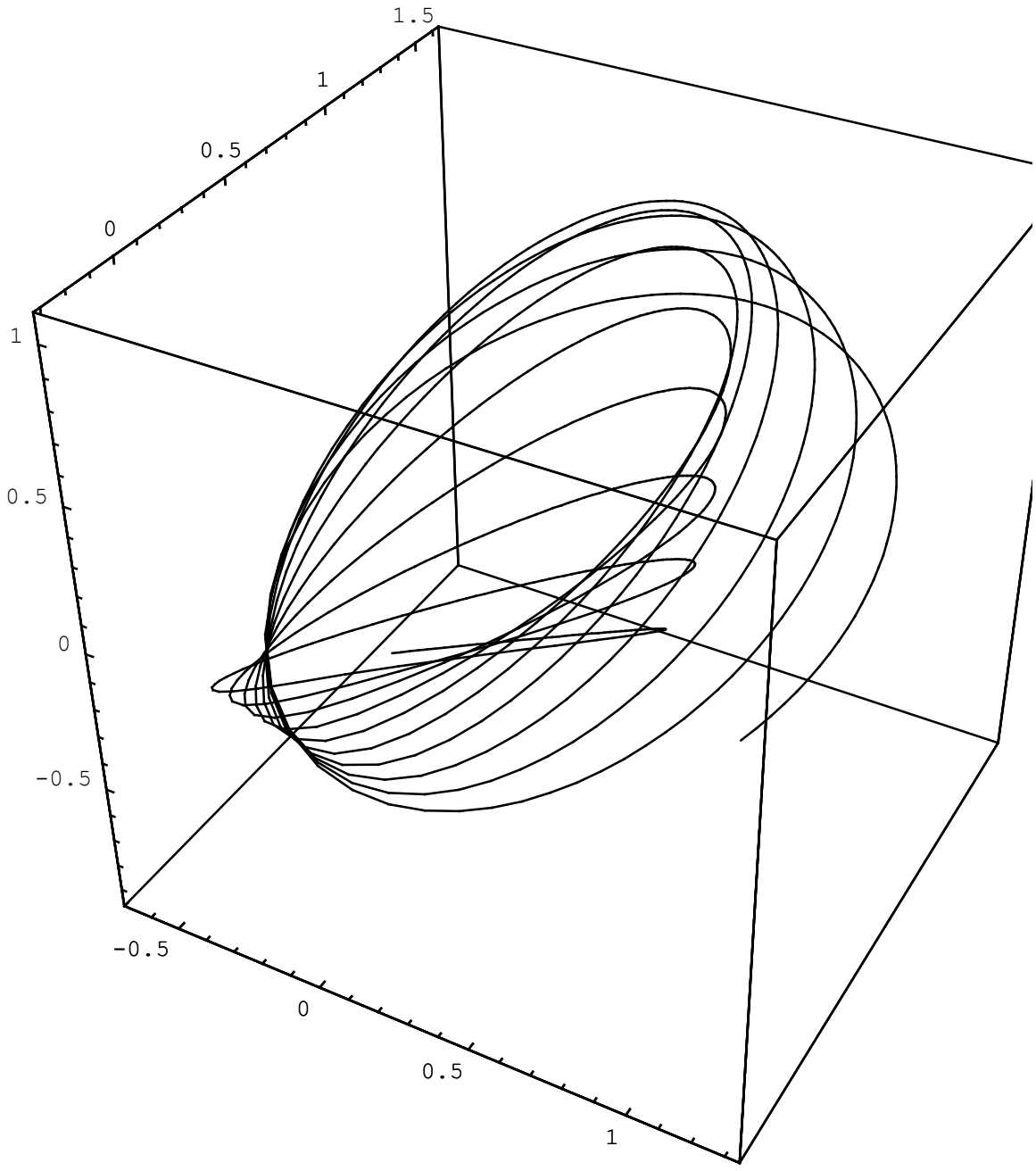
```
Plot[Evaluate[z[t] /. solution], {t, 0, tfinal}]
```




```
- Graphics -
```

```
ParametricPlot3D[Evaluate[{x[t], y[t], z[t]} /. solution],
 {t, 0, tfinal}, AspectRatio → Automatic, PlotPoints → 1000]
```




```
- Graphics3D -
```