

Simulation of pendulum with movable point of suspension

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January 30, 2015

Numerical results

Equation of motion:

$$\left(1 - \frac{1}{2} \cos^2 \theta\right) \ddot{\theta} + \frac{1}{2} \cos \theta \sin \theta \dot{\theta}^2 + \frac{g}{d} \sin \theta = 0$$

Parameters used: $m = 2$ kg and $d = 0.5$ m (distance between pendulum and point of suspension). $s(0) = 0$ and $\dot{s}(0)$ chosen to make the constant of motion zero in all simulations.

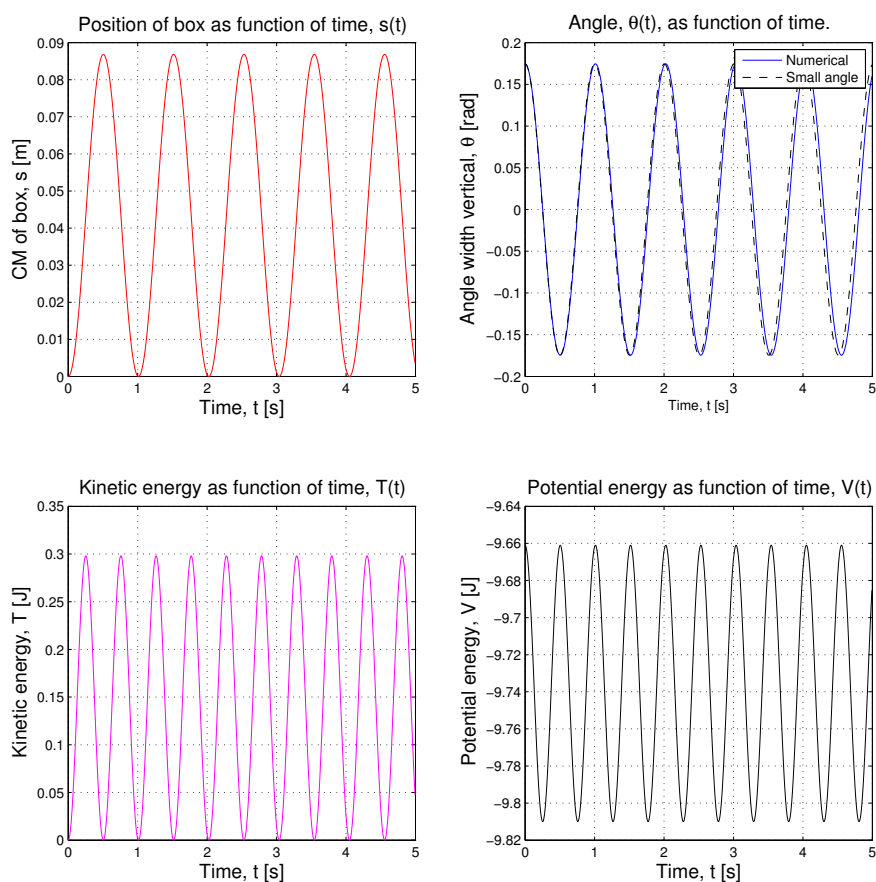


Figure 1: Initial conditions: $\theta(0) = \pi/18$, $\dot{\theta}(0) = 0$ rad/s.

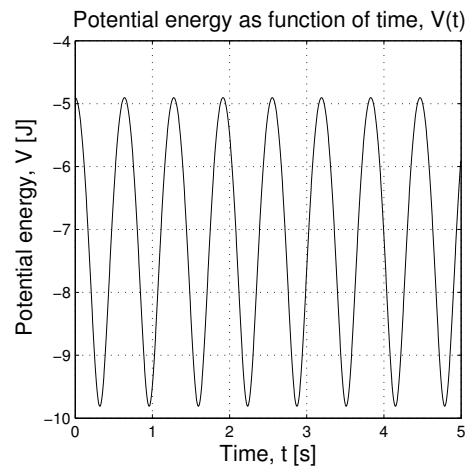
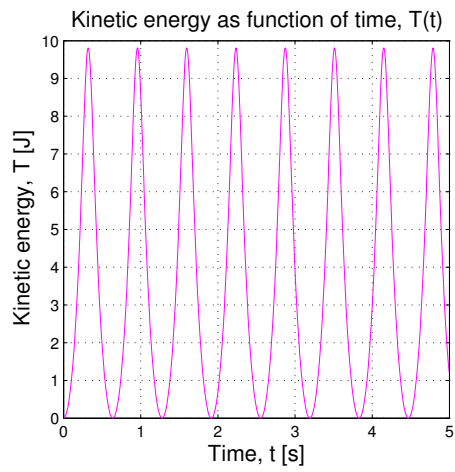
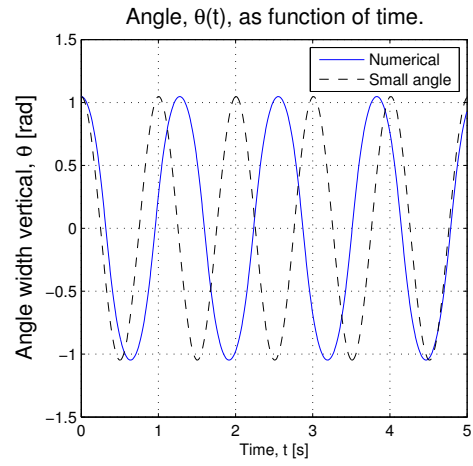
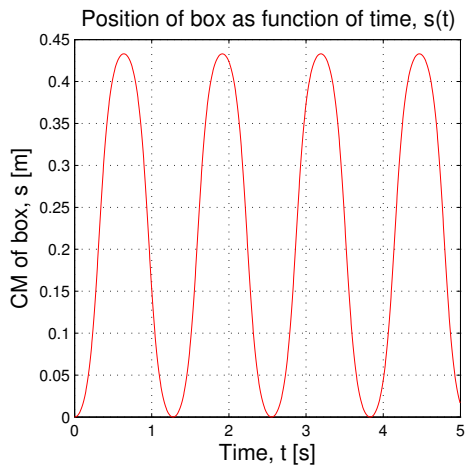


Figure 2: Initial conditions: $\theta(0) = \pi/3$, $\dot{\theta}(0) = 0$ rad/s.

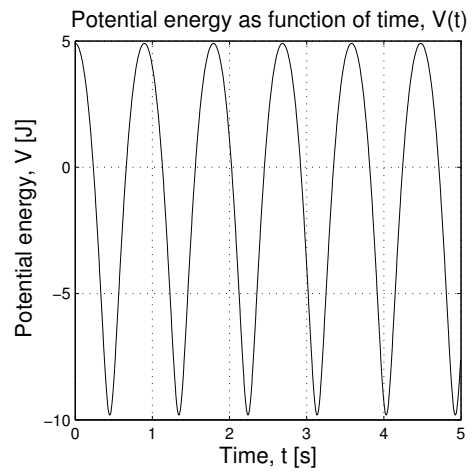
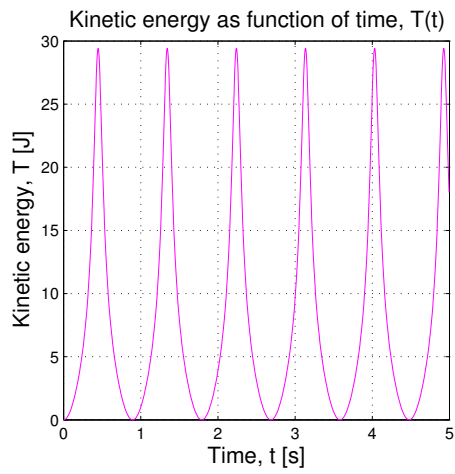
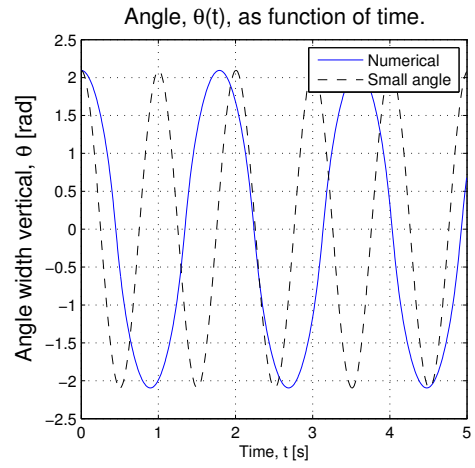
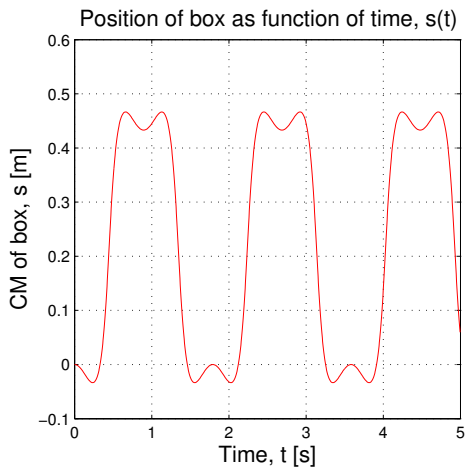


Figure 3: Initial conditions: $\theta(0) = 2\pi/3$, $\dot{\theta}(0) = 0$ rad/s.

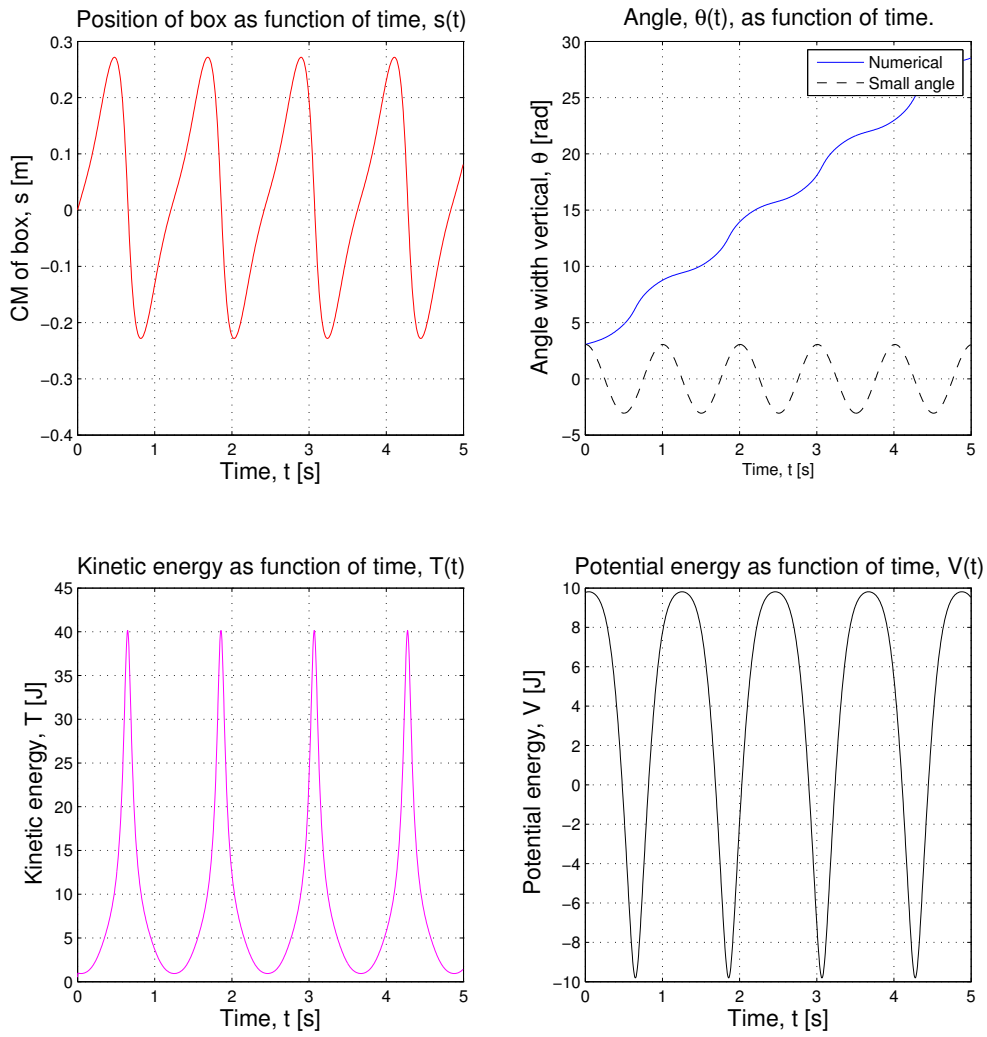


Figure 4: Initial conditions: $\theta(0) = 35\pi/36$, $\dot{\theta}(0) = 2$ rad/s.