

A mass of 5 kg is suspended from a spring of stiffness (force constant) 100 N/m. The damping is given by $\gamma = 0.2\omega_0$, where ω_0 is the natural frequency of the system. At $t=0$, the mass is released from rest from an initial position of 4 cm.

- (a) What is the frequency of the damped oscillations?
- (b) Determine the position and velocity of the mass as a function of time. All quantities should be well defined (i.e. their corresponding values calculated).
- (c) What is the period of the oscillations?
- (d) How long does it take for the amplitude of the oscillations to decrease to 10% of its initial value?
- (e) Does it take the same time as in (d) for the energy to decrease to 10% of its initial value? Calculate this time and compare.
- (f) Which decreases faster, the amplitude or the energy?