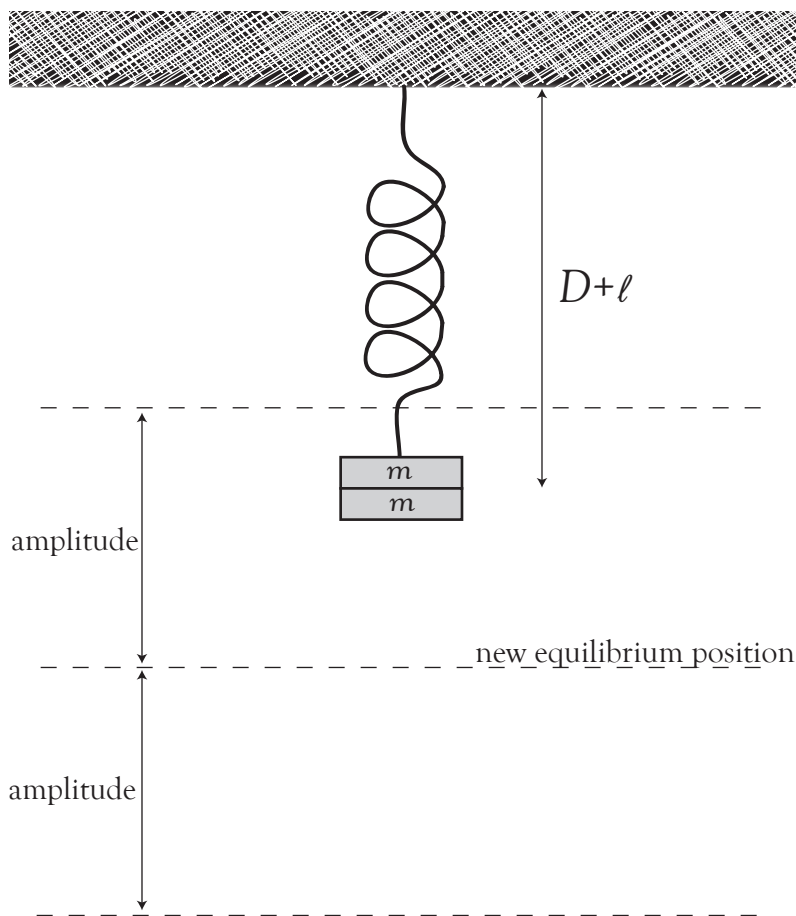


QP40

Problem 1 (6 points) - Collision on a Spring

A linear spring has a free length D . When a mass m is hung on one end, the spring has an equilibrium length $D + \ell$. While it is hanging motionless with an attached mass m , a second mass m is dropped from a height ℓ onto the first one. The masses collide inelastically and stick together. The figure below shows the system at the time of the collision.



- (a) (1 point) What is the new equilibrium length of the spring?
- (b) (1 point) What is the period of the resulting motion?
- (c) (2 points) Find the amplitude of the motion. Express your answer in terms of ℓ .
- (d) (2 points) How long after the collision do the joined masses reach the lowest point of their oscillation? Express your answer in terms of ℓ and g .