[mex220] From sliding to rolling motion
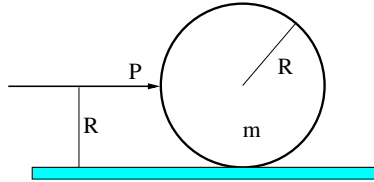
A billiard ball (rigid homogeneous sphere of mass m and radius R) is initially at rest on a flat table. A cue then imparts a horizontal impulse $\mathbf{P}$ in a very short time at height R. The coefficient of kinetic friction between table and ball is μ. (a) Find the time t_r that elapses before the motion of the billiard ball turns into pure rolling. (b) Find the speed v_r of the rolling billiard ball.

Solution: