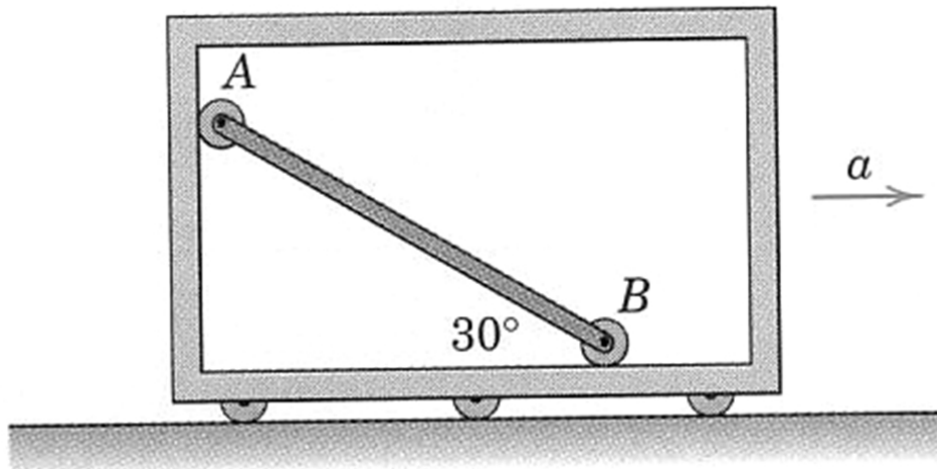


2.003/1.053 Dynamics and Controls I
Spring 2007
Problem Set 5

Issued on Monday, March 12th
Due in lecture on Monday, March 19th

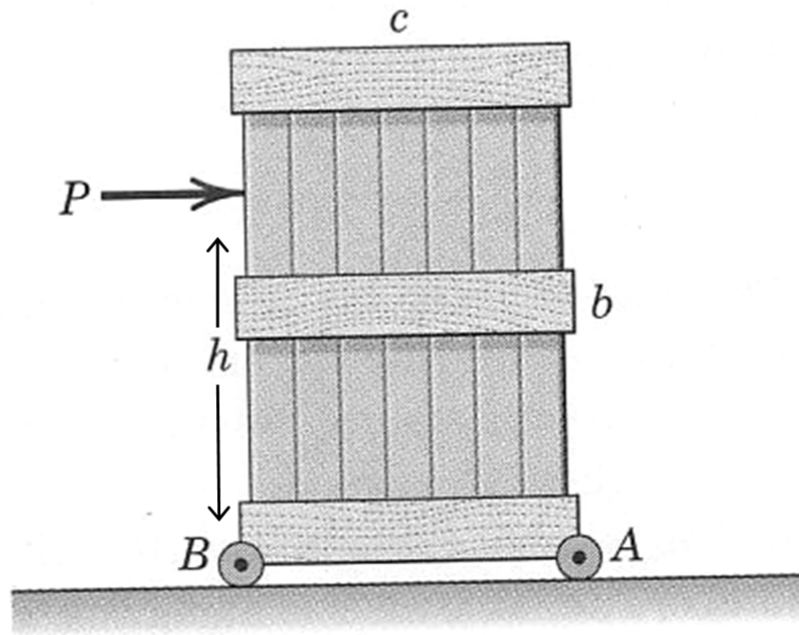
1 Rod leaning on a moving frame

For what acceleration a of the frame will the uniform slender rod maintain the orientation shown in the figure? Neglect the friction and mass of the small rollers at A and B .



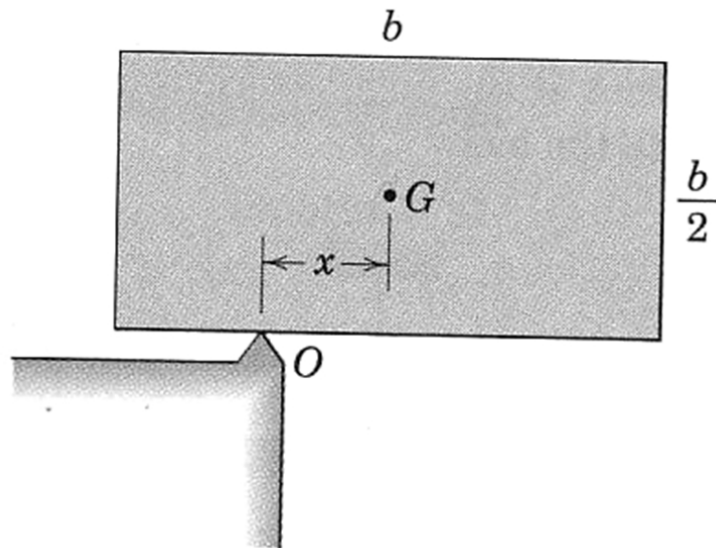
2 Tipping a crate

The homogeneous crate of mass m is mounted on small wheels as shown. Determine the maximum force P which can be applied at a height h above the ground without overturning the the crate about (a) its lower front edge with $h = b$, and (b) its lower back edge with $h = 0$.



3 Slab falling off an edge

The uniform rectangular slab is released from rest in the position shown. Determine the value of x for which the angular acceleration is a maximum, and determine the corresponding angular acceleration.



4 I-beam on a hinge

The uniform steel I-beam has a mass of 300 kg and is supported in the vertical plane as shown. Calculate the force R supported by the pin at O for the condition immediately after the support at B is suddenly removed. The mass of the bracket on the left end is small and may be neglected. Also treat the beam as a uniform slender bar.

