MECH230 - Fall 2024
Recommended Problems - Set 13

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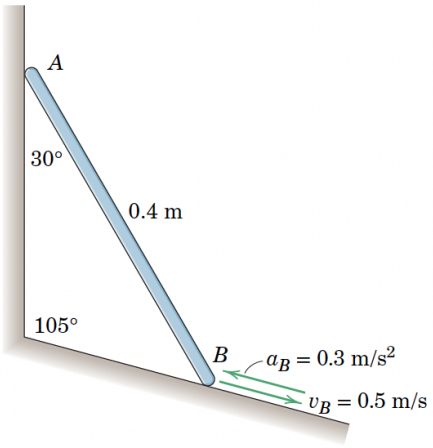
Particle in Noninertial Frame, IC

The problems are taken from J. L. Meriam, L. G. Kraige, and J. N. Bolton (MKB), Engineering Mechanics: Dynamics, Ninth Edition, Wiley, New York, 2018.

In the following problems, feel free to introduce corrotational basis vectors as you see fit.

1. [MKB 05-102]

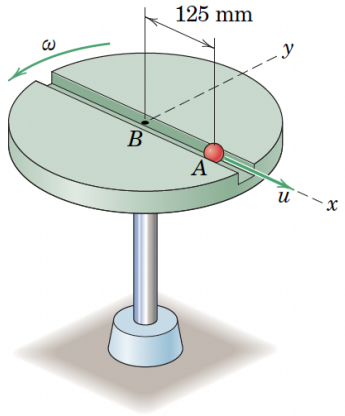
5/102 The bar of Prob. 5/66 is repeated here. The ends of the 0.4-m bar remain in contact with their respective support surfaces. End B has a velocity of 0.5 m/s and an acceleration of 0.3 m/s^2 in the directions shown. Determine the angular acceleration of the bar and the acceleration of end A.



PROBLEM 5/102

2. [MKB 05-125]

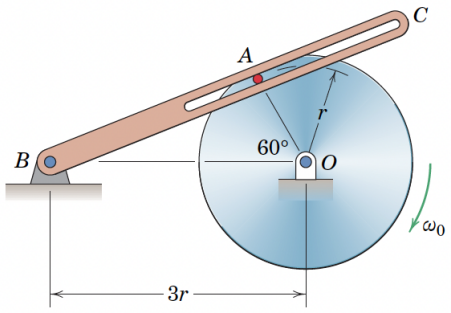
5/125 The disk rotates with angular speed $\omega = 2$ rad/s. The small ball A is moving along the radial slot with speed $u = 100$ mm/s relative to the disk. Determine the absolute velocity of the ball and state the angle β between this velocity vector and the positive x-axis.



PROBLEM 5/125

3. [05-143]

5/143 The disk rotates about a fixed axis through point O with a clockwise angular velocity $\omega_0 = 20$ rad/s and a counterclockwise angular acceleration $\alpha_0 = 5$ rad/s^2 at the instant under consideration. The value of r is 200 mm. Pin A is fixed to the disk but slides freely within the slotted member BC. Determine the velocity and acceleration of A relative to slotted member BC and the angular velocity and angular acceleration of BC.



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