

2.003J/1.053J Dynamics and Control I
Fall 2007

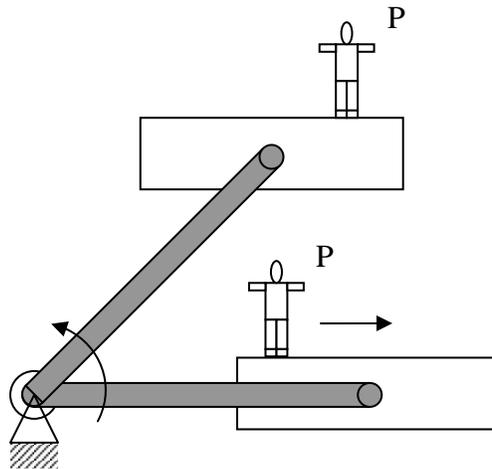
Problem Set 1

Out: Monday, 10 September, 2007

Due: Monday, 17 September, 2007

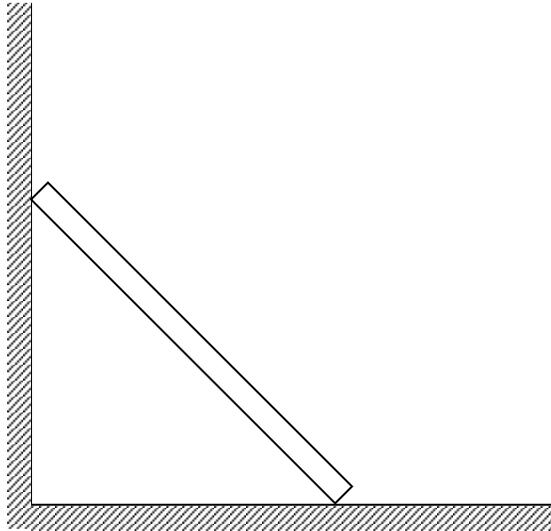
1. Curvilinear translation

A rotating arm and a horizontal platform are shown in the figure below. The arm has length L and rotates in the anti-clockwise direction. The system is designed such that the platform *always* remains horizontal as shown in the figure. This type of the motion of the platform is called as the *curvilinear translation* (illustrated in Figure 3-6 in the textbook). A person P starts walking on the platform. Set up appropriate frames, define appropriate parameter(s) and find the acceleration of P with respect to an observer fixed to the ground.



2. Sliding ladder

A ladder of length L leans on a wall perpendicular to the ground. The ladder starts sliding on the wall and the ground. Set up appropriate frames, define appropriate parameter(s) and find the acceleration of the center of the ladder with respect to an observer fixed to the ground.



3. Robot manipulator

A robot arm consisting of links A and B, and the end-effector E is shown in the figure below. Link A rotates in the anti-clockwise direction with a constant angular speed ω_A , while link B rotates in the anti-clockwise direction with a constant angular speed ω_B with respect to link A. End-effector E slides along link B. Set up appropriate frames, define appropriate parameter(s) and find the acceleration of E with respect to an observer fixed to the ground.

