

1 Direct Dynamics

Newton-Euler Equations of Motion

Problem 4

Figure 1.7 depicts two uniform rods 1 and 2 of mass $m_1 = m_2 = m$ and length $OA = AB = 2L$. The rod 1 is connected to the ground by a pin joint at O and to the rod 2 by a pin joint at A . The rods are constrained to move in a vertical plane xOy . The x -axis is vertical, with the positive sense directed vertically downward. The y -axis is horizontal and is contained in the plane of motion. The rod 1 is moving and the instant angle with the vertical axis Ox is $q(t)$. The rod 2 is connected to the ground by a pin joint at B which is confined to move in a vertical slot. The local acceleration of gravity is g . Find the equations of motion of the system.

Numerical application: $m = 1$ kg, $L = 1$ m, and $g = 10$ m/s².

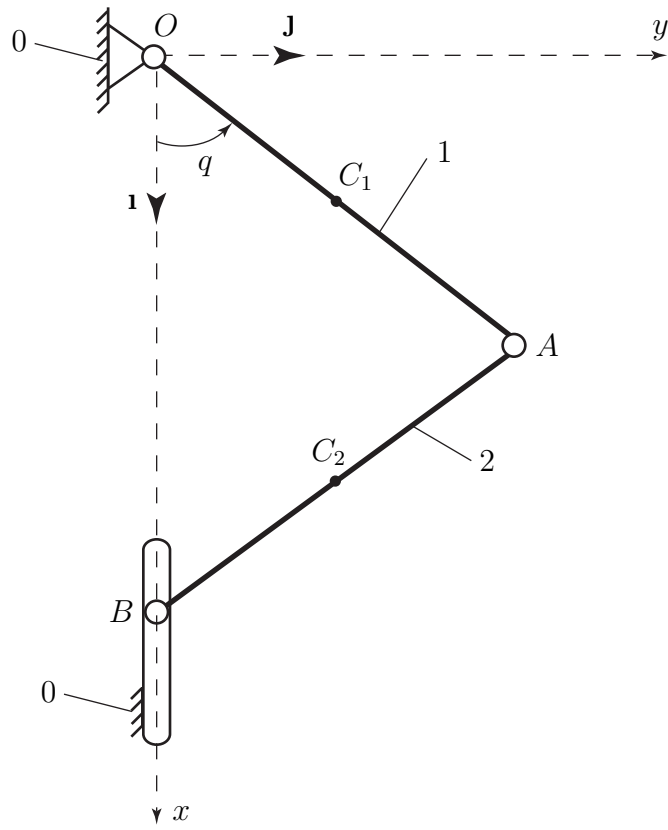


Figure 7