Problem #1: A 1.0 kg block is threaded into a rectangular slot of slightly larger width which is machined into the top surface of a horizontal disk. Given that the disk spins as a rigid body with an angular acceleration of 2.0 rad/s² about its axis, and that the disk itself has a uniform mass of 1.0 kg, and that the disk is known to block is being drawn inward by a cord which passes through a hole in the disk concentric with the center axis. Given that the block starts from rest at t = 0, \( r = 4.0 \text{ m} \), and that the coefficient of kinetic friction between the block and the inner surface of the disk is \( \mu_k = 0.25 \) and \( \mu_s = 0.50 \), determine the cord tension at this instant.

The slot sidewalls have a zero value.

At what moment in time does the normal contact force with function of time, [best expressed in cylindrical form]

(d) determine the acceleration (vector) for the block at a slope is \( \theta = 0.25^\circ \), between the block and the bottom and side walls of the disk. It is known that the disk starts from rest at \( r = 2.0 \text{ rad/s} \) when the block has a constant angular acceleration of 2.0 rad/s² above its axis.

Instructor: Dr. P.A. Dasher Midterm Intermediate Dynamics Fall 2003

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