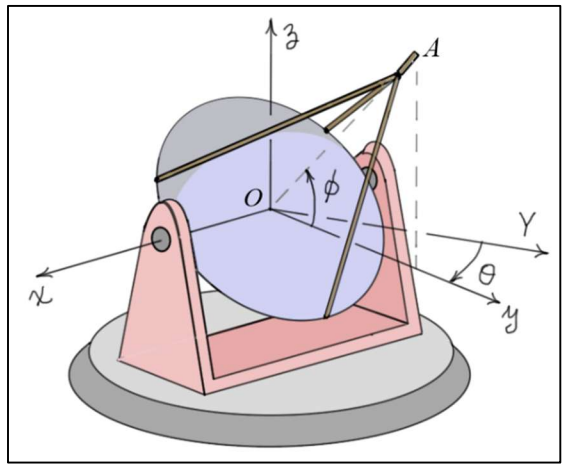
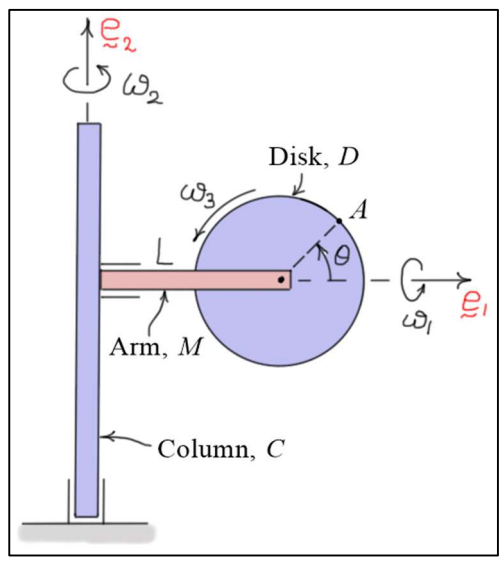
Intermediate Dynamics
Exercises #2A

1) The antenna system shown has two components, the base B and the antenna dish D. The distance from O to A is L. At any instant, the angle between the rotating y-axis and the fixed Y-axis is given by the angle θ, and the angle between OA and the y-axis is given by the angle ϕ. Calculate $\underset{\sim}{v}_A$ and $\underset{\sim}{a}_A$ the velocity and acceleration of point A using the formulae for two points ***fixed*** on a rigid body. (The problem comes from Hibbeler, *Engineering Mechanics*, 1998)



2) The system shown has ***three components***, a vertical column C, a horizontal arm M, and a disk D. The disk has radius r and rotates relative to the arm at a rate of ω_3 (rad/sec). The arm has length L and rotates relative to the column at a rate of ω_1 (rad/sec). The column rotates at a rate of ω_2 (rad/sec) relative to the ground. Calculate $\underset{\sim}{v}_A$ and $\underset{\sim}{a}_A$ the velocity and acceleration of point A using the formulae for two points ***fixed*** on a rigid body. The angular rates ω_i $(i = 1, 2, 3)$ are ***not*** constant.