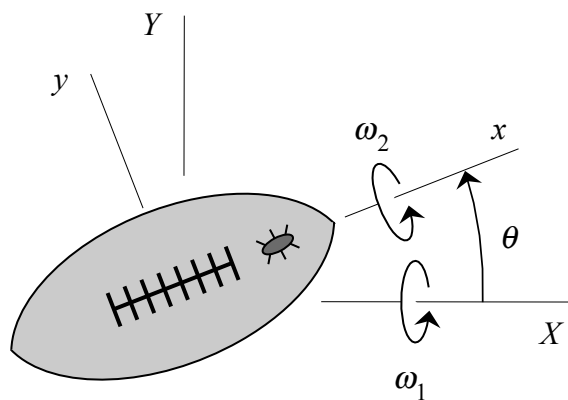


Homework H.3.I

Given: A football is released with two components of rotation: $\omega_1 = \text{constant}$ about a fixed horizontal axis, and $\omega_2 = \text{constant}$ about the symmetry axis of the football. An unfortunate insect was on the football on release and will serve as our observer fixed to the football. A set of xyz axes are attached to the ball with the x -axis being aligned with the symmetry axis of the ball. A set of stationary XYZ axes are also used with the X -axis being horizontal. A constant angle of θ exists between the symmetry axis of the ball and the fixed horizontal axis.

Find: Determine the angular velocity and angular acceleration of the insect.



Use the following parameters in your analysis: $\theta = 12^\circ$, $\omega_1 = 4 \text{ rad/s}$ and $\omega_2 = 8 \text{ rad/s}$.