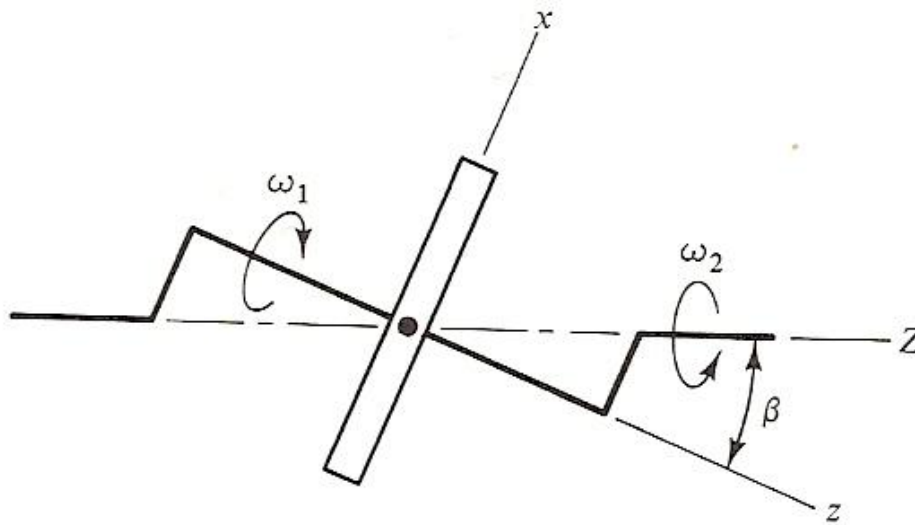
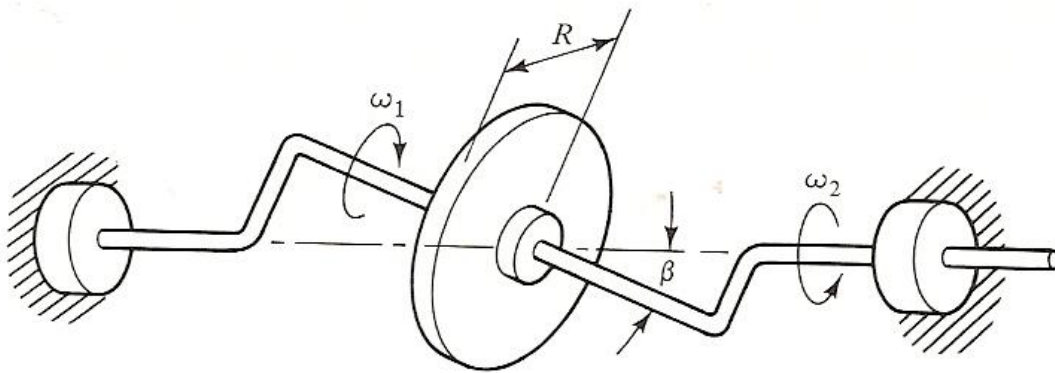


Example: (Momentum & Energy)

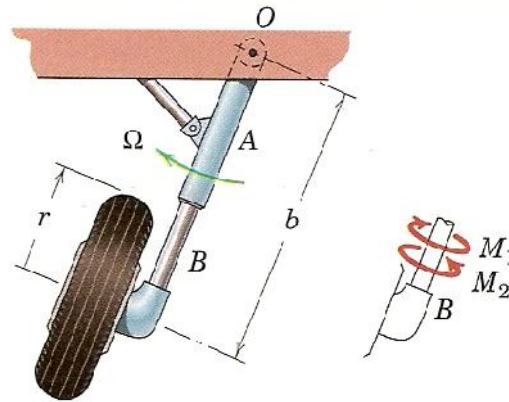
A homogeneous disk of mass m and radius R spins at a rate ω_1 about its skew axis, which rotates about the horizontal at rate ω_2 . Determine

- the angular momentum of the disk relative to the center of mass C .
- the kinetic energy of the disk.



Example: (Gyroscopic Effect)

An airplane has just cleared the runway with a takeoff speed v . Each of its freely spinning wheels has a mass m , with a radius of gyration k about its axle. As seen from the front of the airplane, the wheel processes at the angular rate Ω as the landing strut is folded into the wing about the pivot O . As a result of the gyroscopic action, the supporting member A exerts a torsional moment M on B to prevent the tubular member from rotating in the sleeve at B . Determine M and identify whether it is in the sense of M_1 or M_2 .



Example: (Football)

The figure shows a football in three common in-flight configurations. Case (a) is a perfectly thrown spiral pass with a spin rate of 120 rev/min. Case (b) is a wobbly spiral pass again with a spin rate of 120 rev/min about its own axis, but with the axis wobbling through a total angle of 20° . Case (c) is an end-over-end place kick with a rotational rate of 120 rev/min. For each case, specify the values of s , θ , β , and $\dot{\psi}$. The moment of inertia about the long axis of the ball is 0.3 of that about the transverse axis of symmetry.

