

Movimento de piões

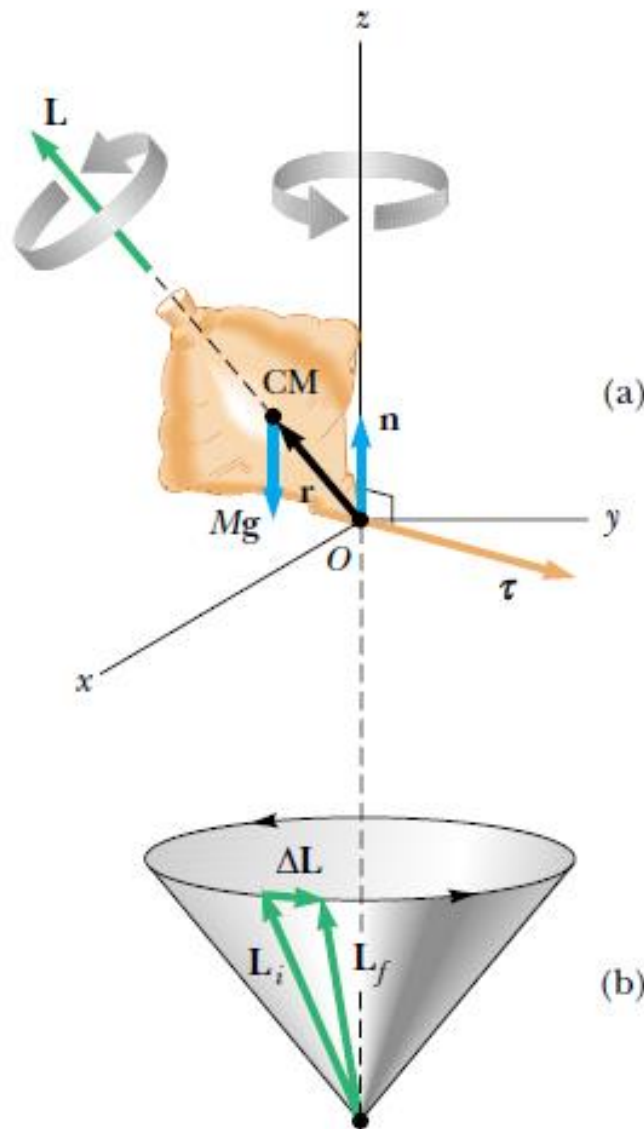


Figure 11.14 Precessional motion of a top spinning about its symmetry axis. (a) The only external forces acting on the top are the normal force \mathbf{n} and the gravitational force $M\mathbf{g}$. The direction of the angular momentum \mathbf{L} is along the axis of symmetry. The right-hand rule indicates that $\boldsymbol{\tau} = \mathbf{r} \times \mathbf{F} = \mathbf{r} \times M\mathbf{g}$ is in the xy plane. (b). The direction of $\Delta\mathbf{L}$ is parallel to that of $\boldsymbol{\tau}$ in part (a). The fact that $\mathbf{L}_f = \Delta\mathbf{L} + \mathbf{L}_i$ indicates that the top precesses about the z axis.

Movimento de giroscópio

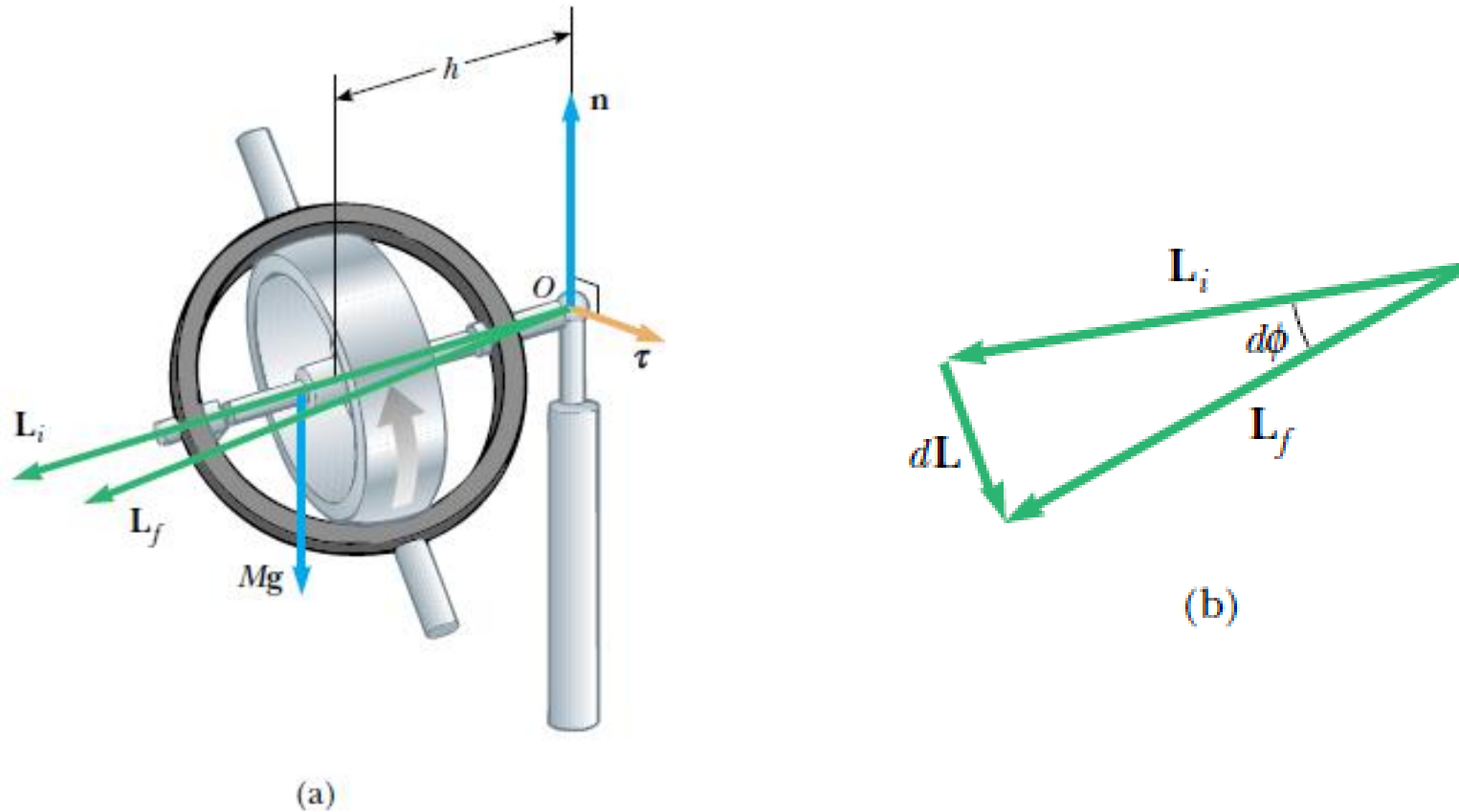


Figure 11.15 (a) The motion of a simple gyroscope pivoted a distance h from its center of mass. The gravitational force Mg produces a torque about the pivot, and this torque is perpendicular to the axle. (b) Overhead view of the initial and final angular momentum vectors. The torque results in a change in angular momentum dL in a direction perpendicular to the axle. The axle sweeps out an angle $d\phi$ in a time interval dt .