**Three-Dimensional Mass Moment of Inertia**

centroidal torque  in local directions to cause angular acceleration  in local directions of differential mass  at local location 

dm

dm

Gi

Gi





















alternately 



rotated into global directions 



about global origin 



about local origin j   





 for symmetric objects and about principal axes

eigenvalues are principal components along diagonal 

eigenvectors are unit vectors for principal directions in columns of 



angular momentum in local directions



angular momentum in global directions



rotational kinetic energy



**Rotational equations of motion in local coordinates**









 





















