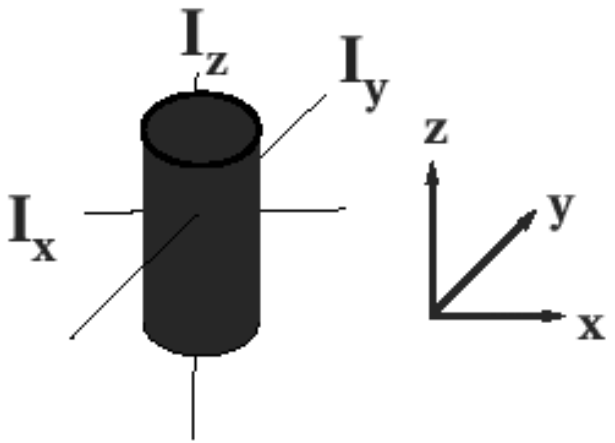
Inertia Tensor for Simple Shapes

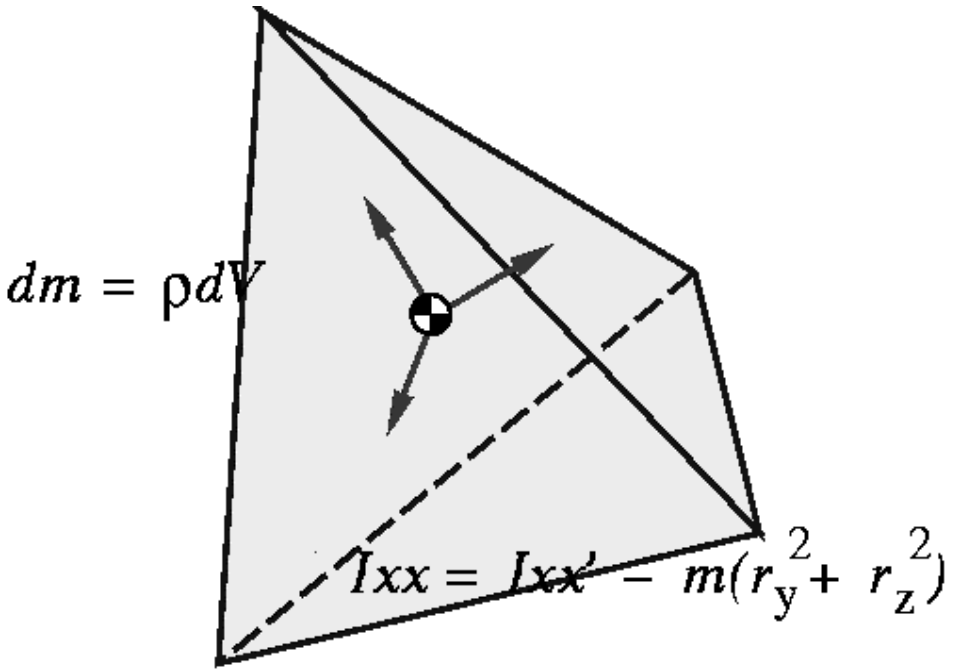


$$I_x = I_y = 1/12\ m\ (3r^2 + L^2)$$

$$I_z = \frac{mr^2}{2}$$

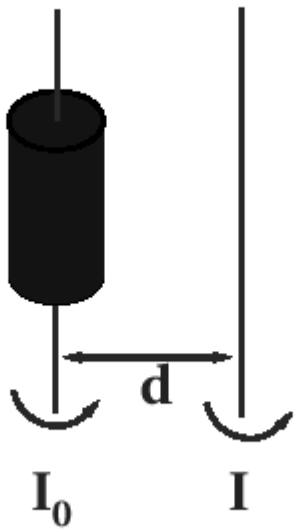
Moment of Inertia of Polyhedral Objects

- *Brian Mirtich*
  - Fast and accurate computation of polyhedral mass properties, JGT 1996



Parallel Axis Theorem

$$I = I_0 + md^2$$

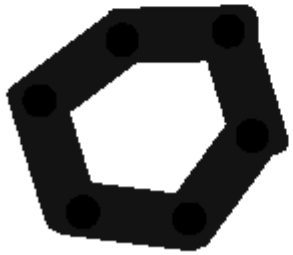


Linked Rigid Bodies

what can we simulate?

open loop

closed loop



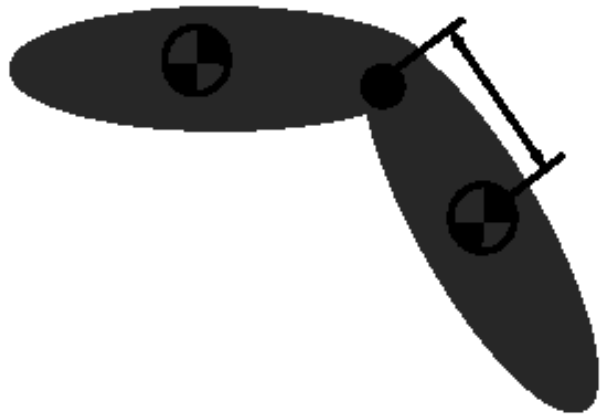
joints

rotary joints (1,2,3d)

telescoping joints

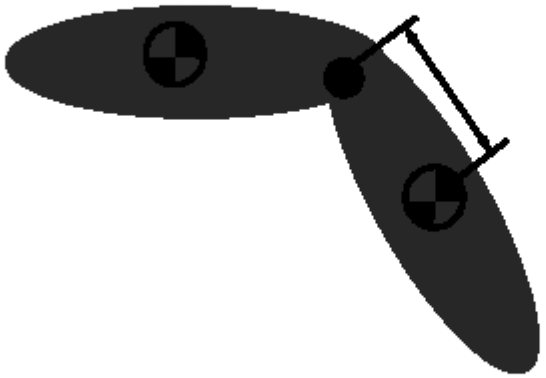
Dynamics of Linked Bodies

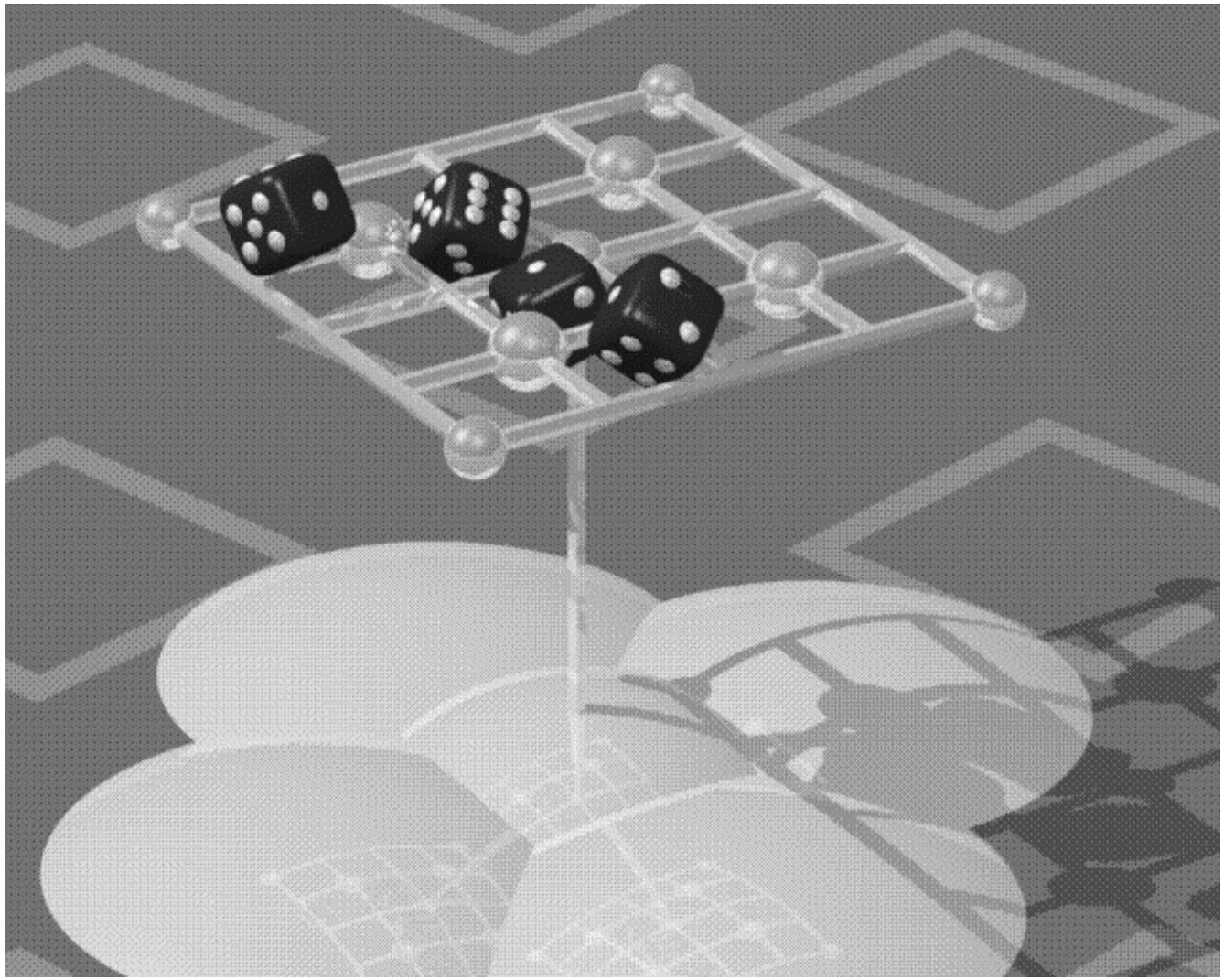
- Two approaches:
  - Treat each link separately and apply constraints at joints
  - Recursive forward dynamics formulation



SDFast, Symbolic Dynamics

link: mass, moi
joints: DOF,
distance from COM of links



code for the equations of motion
hooks for applying forces, torques

Collisions