

2-D rigid object dynamics review

double pendulum on computer

2-D rigid object summary: Draw FBD's of parts and collections of parts

Pick coordinates ($q_i = \theta, x, y$ of parts, usually)

→ minimal or generalized coordinates + others

Write LMB, AMB for each FBD (3 scalar equations)

Kinematic constraint equations

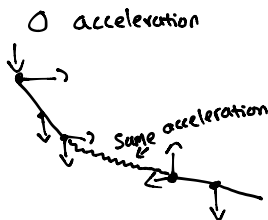
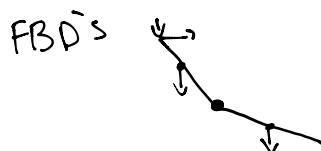
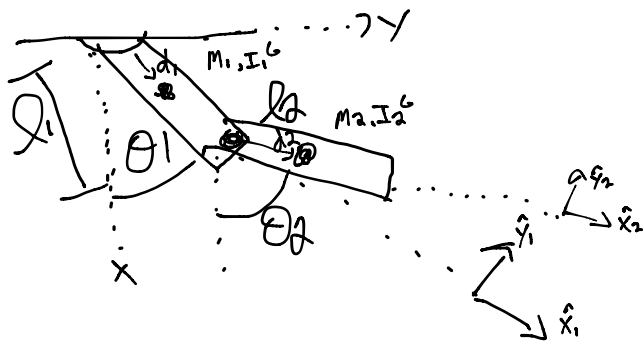
Given q, \dot{q} . Parameters we solve for \ddot{q} , and constant forces

Equations of Motion (EOM)

Equations are linear in $\ddot{q}, F_i^{\text{const}}$, applied forces

Non-linear in \dot{q}, q

Double Pendulum (see lectures from Nov 11th, 15th)



6 ODE's

4 constraint Equations

Solve for $\ddot{\theta}_1, \ddot{\theta}_2, \ddot{x}_1, \ddot{y}_1, \ddot{x}_2, \ddot{y}_2$, 4 constraint forces

Matlab!