Mechanical Translation

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Add slides to introduce

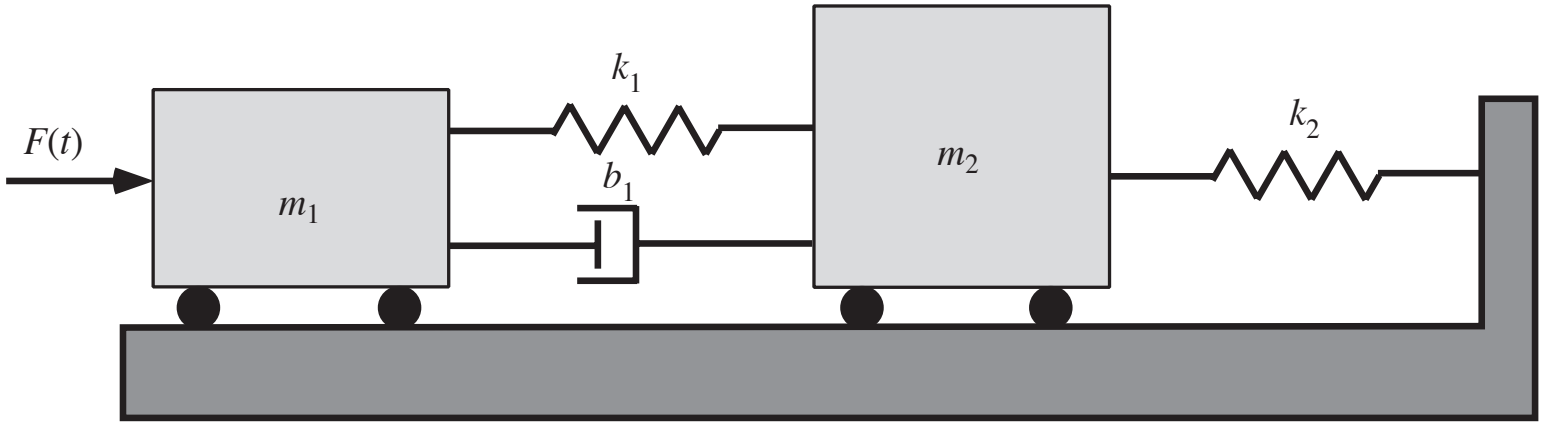
Deriving equations of motion for mechanical systems

Five steps:

1. Define system geometry
2. Apply force balance relations
3. Define kinematic relationships
4. Define constitutive relations for system elements
5. Combine relations to get EOM

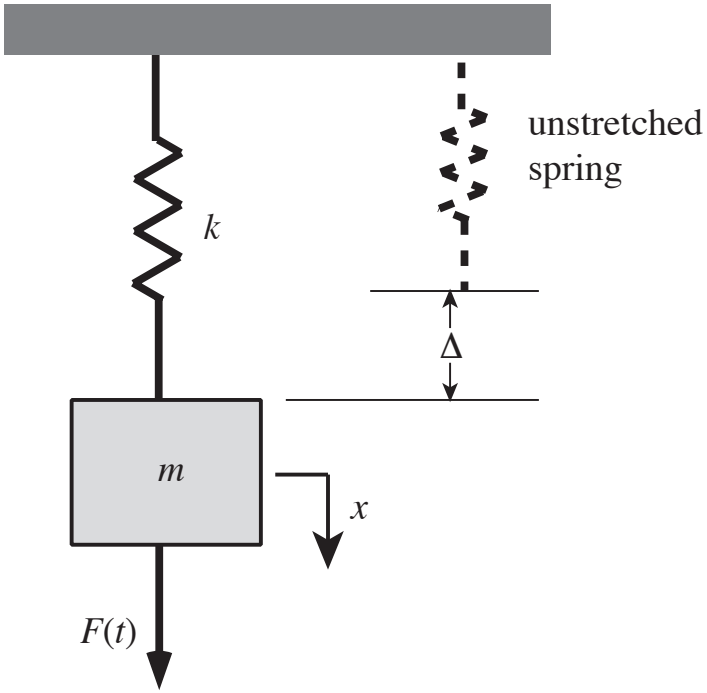
Step 3 most commonly occurs in problems involving mix of translation and rotation

Example system



Machine part example

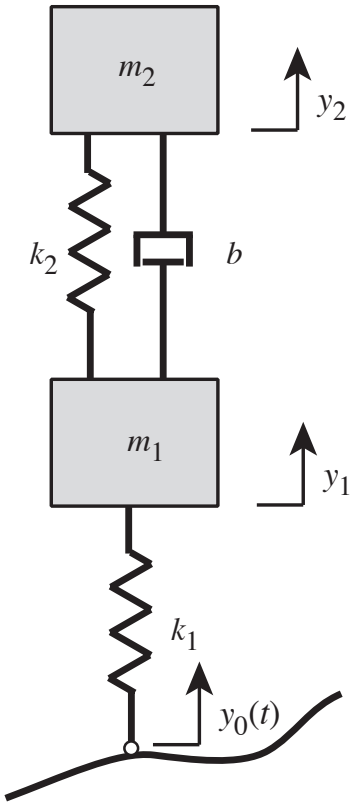
Effect of gravity on dynamics



Key idea:

In systems having springs and gravity forces, gravity forces can be “neglected” if displacements are taken relative to static equilibrium position of system

Quarter car suspension example



- Measure displacements relative to static equilibrium positions
- Not relative to positions where springs are uncompressed