Module 1 - Introduction

ME3050 - Dynamics Modeling and Controls

May 29, 2020

Topic 3 - Modeling Assumptions

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- Simplify Complex Systems
- Increase Complexity Incrementally
- Solid Mechanics and Dynamics
- Thermal and Fluid Systems
- Electrical and Power Systems

Simplify Complex Systems

Engineers encounter complex systems and these systems are difficult to model and analyze. Analysis requires multiple steps or processes and modeling requires iteration. Typically, you cannot solve these complex problems in your head alone.

Image: Wikipedia

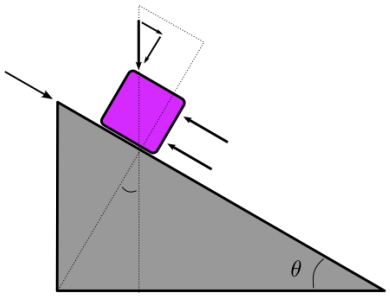
Increase Complexity Incrementally

Engineers model and analyze complex systems one piece at a time on a component level.

In system dynamics we study the behavior of complex systems by modeling the iterations and responses of the different components involved. Our models will start simple and build in complexity as the theory is presented.

Solid Mechanics and Dynamics

- Frictionless Sliding ?
- Pure Roll - No Slip
- Planar Motion



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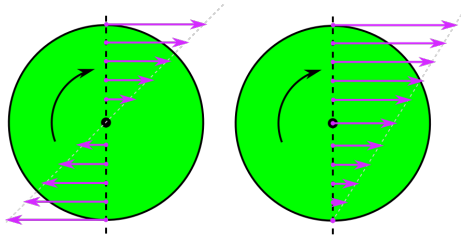
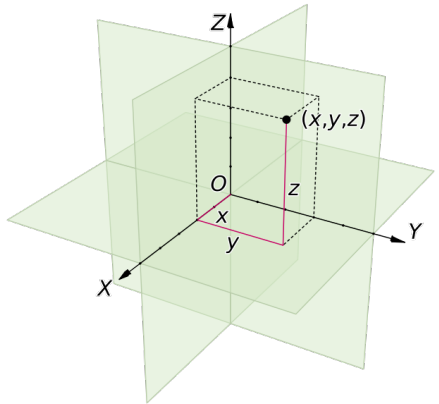




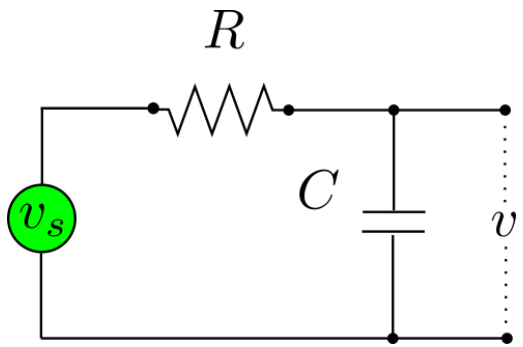
Images: TH, Wikipedia

Thermal and Fluid Systems

- Viscous Boundary Layer
- Insulated or Constant Flux Boundaries
- Others?

Electrical and Power Systems

- No Heat Loss or Generation
- Ideal Conductors
- Zero Order System Behavior



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