Design and Modeling of Fluid Power Systems  ME 597 / ABE 591

Fall Semester 2015
This course provides an introduction into modeling and design of fluid power components and systems. Modeling techniques based on physical laws and measured performance characteristics will be applied to design and analyze component and system performance. Fundamentals: design principles of displacement machines, flow and pressure control, motion control using resistance control, motion control using displacement controlled actuators, variable speed transmissions, modeling of flow in lubricating gaps, transmission line models, secondary controlled systems, load sensing systems.

- **Displacement Machines**
  - Design principles
  - Steady state characteristics, measurement and modeling
  - Gap flow models
  - Flow and pressure pulsation
  - Instantaneous cylinder pressure

- **Resistance Control**
To learn to design fluid power systems and to understand the function of components and how to model their steady state and dynamic behavior.
To determine steady state and dynamic characteristics of fluid power components and systems based on measurements
  - Pressure and flow control
  - Servo- and proportional valves
  - Nonlinear and linear system models

- **Valve controlled systems**
To learn how to model fluid power components and systems based on physical laws and when to use these models.
  - Modeling and design of linear actuators
  - Dynamic performance
  - Design example

- **Displacement controlled systems**
To learn how to design advanced energy saving hydraulic actuators and transmissions and to predict their performance.
  - Pump control system design
  - Design of hydrostatic transmissions
  - Secondary controlled actuators
  - Pump controlled linear actuator

- **System design - special topics**
  - Power supply systems
  - Load sensing
  - Energy aspects

by Monika Ivantysynova, MAHA Professor Fluid Power Systems

- **Tuesday 8:00 - 11:00 @ MAHA LAB,**
  1600 Kepner Drive, Lafayette
- **Thursday 1:00 – 2:45 (lab 2 times only)**
- **3 credits**