

Massachusetts Institute of Technology
Department of Mechanical Engineering

2.151 ADVANCED SYSTEM DYNAMICS AND CONTROL

Lecture No 4 Information sheet
Tuesday 19, 2002

Topics:

- Linearization
 - * Linearization methods
 - * Taylor series expansion
 - * Example:
 - A magnetic suspension system
- *examples:
 - A nonlinear hydraulic system (1 state variable)
 - A linear hydraulic system (2 state variables)

•Energy-based Lumped Parameter Modelling

- *Energetic systems: Motivation
- *Examples:
 - An electrical circuit (one state variable)
 - An electrical circuit (two state variables)
- Power, energy and generalized variables
- First law

Reading Assignment:

- Karnopp and Rosenberg*: Chapter 3 (skip discussions on 2-ports elements, sections 3.2, part of 3.4.2, 3.5 and 3.6). (Optional)

Problem Sets

PS#1 is due Friday September 22nd.

Handouts:

1. Lecture No 4 information sheet

Notes:

1. Practice session 1 is rescheduled for Friday, March 1.
2. Handouts can be found at <http://web.mit.edu/2.151/www>
3. You may use the following reference to review some classical control concepts:
Modern Control Engineering, K. Ogata, Prentice Hall 1970.
Chap. 2 Laplace Transform, Chap. 3 Linear Algebra, Chap. 5 Basic Controllers (P, PD, PID), Chap. 6 Time Response (First and second order responses), Chap. 8 Root Locus, Chap. 9 Frequency Response, Chap. 10 Compensation techniques.
4. Weekly tutorial sessions will be held on Mondays from 4:00pm to 5:00pm in room 3-343. Except today we use room 5-233.
5. The TA's office hours are scheduled for Tuesdays and Wednesdays from 1:30pm. to 2:30pm in room 1-010.