AAE 666

NonL*in*EAR DYNAMICS, SYSTEMS, AND CONTROL

Spring 2019

Objectives. To introduce fundamental concepts and tools which are useful in the analysis of nonlinear systems and in the design of controllers and estimators for such systems. The results are illustrated by and applied to a variety of engineering systems including aerospace systems mechanical systems and communication systems. The topics covered include:

- Stability Concepts
  Stability, boundedness, decay rates,
  Lyapunov analysis

- Approximation Methods
  Describing functions
  Singular perturbations

- Input-Output Description
  Small gain theorem, circle criterion

- Controller Synthesis

- State Estimation

- Numerical Techniques for Analysis and Design including Linear Matrix Inequalities

Text: Course notes will be provided

References:
Khalil, K. H., *Nonlinear Systems*, 3rd Edition, Prentice Hall, 2001.
Boyd, S., El Ghaoui, L., Feron, E., and Balakrishnan, V., *Linear Matrix Inequalities in System and Control Theory*, SIAM, 1994.

Prerequisites: AAE 564 (Linear system analysis and synthesis) or equivalent.

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