ENME 606

NONLINEAR CONTROL DESIGN — Prof. M. Krstic

PROJECT

The purpose of the project is for you to get familiar with one nontrivial nonlinear control application connected with the course.

1. Read papers in
   (a) ASME J. Dynamic Systems, Measurement, and Control
   (b) AIAA J. Guidance, Control, and Dynamics
   (c) IEEE Transactions on Control Systems Technology
   (d) IEEE Control Systems Magazine
   (e) Automatica
   (f) IEEE Transactions on Automatic Control

   or your other favorite journal, conference (e.g., American Control Conference or IEEE Conference on Decision and Control), or book. You can also select a project topic from your thesis area if it has a justifiable and significant nonlinear character. You will probably have to browse through quite a few abstracts and papers until you find a problem that you like and that is adequate for your project. Come and let me know about the progress in your search. Based on your affinities, I may suggest some topics to you. I will be most impressed if you find an applications problem that I was not aware of.

2. Look for a problem with uncertainties in a nonlinear model. The uncertainties can be parametric, disturbances, unmodeled dynamics, etc. Try to see if a method from the course would be applicable to the problem. Come to consult me if you are not sure.

3. When you feel you found a nice problem but before you invest serious work into it, come and tell me shortly about the problem.

4. Submit a 3(typed)–5(handwritten) proposal explaining the problem by **Monday, April 29**. Make sure to specify and physically motivate (a) the control objective (equilibrium stabilization or trajectory tracking) and (b) the form of uncertainties. Outline the approach you plan to take. Attach the paper(s) that motivates your project.

5. Design a nonlinear controller. Simulate in SIMULINK and compare with a design based on Jacobi linearization, or with some other linear or nonrobust nonlinear design. Discuss the results—what was achieved with your controller? Start the report with a $\leq$ half-page abstract. Include a list of references at the end.

6. If you develop interest in some theoretical problem, your project need not be related to an application topic. However, in that case, the project needs to be of research quality and contain a creative component. Literature survey type theoretical projects are not acceptable. If you have an idea you are excited about, come and check with me whether someone has already done it, and whether there is light at the end of the tunnel.

7. Submit the project report by **Friday, May 17**.

8. An oral presentation of the projects will be held. Date and time to be announced. Length of each presentation: 20 mins.

9. Since there is no final exam for the course, you are expected to invest serious work into the project. Some of the projects may be publishable and I will consider them for possible submission to conferences coming up in Spring/Summer 1997.