ECE 680 Purdue University

FunWork #4

The objective of this assignment is to design MPC controllers using the linearized model as a design model. Your controllers are to be tested on the continuous-time nonlinear model implemented using SIMULINK.

Submit an html or pdf file of your published MATLAB m-file with your code divided into sections, cells, using section breaks. Submit also your animation files.

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1. (**15 pts**) Discretize the linearized model and use it as the basis for your design. You as a designer select the sampling interval h.

2. (**15 pts**) First design an MPC using the augmented model without any constraints and implement the controller on the nonlinear continuous model. Write a script that animates the behavior of the closed-loop system for different initial conditions.

3. (**15 pts**) Impose constraints on the inputs and outputs. Re-design your MPC. Implement the controller on the nonlinear continuous model. Write a script that animates the behavior of the closed-loop system for different initial conditions.

4. (**15 pts**) Implement the combined MPC controller-observer compensator and test it on the nonlinear continuous-time (CT) model. Write a script that animates the behavior of the closed-loop system for different initial conditions.

5. (**40 pts**) Repeat your MPC designs using the non-augmented model.