

Automotive Control Systems (EE 5812/ MEEM 5812)

Project #5

Rule Based Antilock Brakes

Submit: Your report as a pdf-file into Canvas and an m-file of the controller into Canvas

This project is meant as a review rule based antilock brake control. I will provide a simulation of the braking system. The file will be containing the simulation program is “RuleBasedAntilockBrakeSim.m” This simulation will compute the slip ratio, so you just have to determine the brake torque that you want to minimize stopping time. Note that this simulation has a hard time dealing with the divide by zero that occurs when the speed stops, so we will only brake until the speed is down to 5 mph. At this point, you can assume that antilock braking ceases. The simulation program I supply will call another Matlab script called “RuleBasedAntilockBrakeController.m” this script (there will be three) is what you have to generate and upload.

There are two road profiles: A Dry Road and a Wet Road. You will be given a chance to select the road profile when you start the simulation program. Your job is to generate three controllers: One that minimizes stopping distance on the dry road; One that minimized the stopping distance on a wet road, and one that minimizes the sum of the stopping distances on both roads (a compromise controller). Note that the simulation program will display stopping time at the end of the simulation.

When complete, upload your three “Controller” scripts to Canvas. Make sure you label which one is for what application (dry, wet, or both). Generate a report consisting of the following information:

1. Plots showing your controller’s performance. The plot generated by the simulation with the three subplots is what I want here. Note that you should generate 2 plots (one for each road condition) for each of the 3 controllers (a total of 6 plots).
2. One page showing the stopping times for the 6 cases.

Comments:

Each student should do this project individually and no student should share Simulink diagrams, code or results with other students. Note that I will be running your results through a similarity checker. If you have shared results and it is detected, I will notify the dean of students that I suspect cheating! So, please don’t share code. But, feel free to ask your instructor questions.