

ECE 229 HYBRID AND SWITCHED SYSTEMS

HOMEWORK #8

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Problem 1. Consider the following SISO process transfer function

$$H(s) = \frac{ps + 1}{(s + p)(s + 2)},$$

where p denotes an unknown parameter taking values in the set $\mathcal{P} := [-1/4, 5]$.

1. Design a small number of candidate controllers so that for each admissible value of the unknown parameter, at least one of the candidate controllers yields acceptable step-response performance and noise rejection.
2. Design a state-shared multi-estimator for this system.

Pick a few representative values of the unknown parameter. For each of these close the loop with a stabilizing controller and test through simulation the ability of your multi-estimator to determine the correct parameter value by looking at exponentially weighted performance signals (even in the presence of some measurement noise).

3. Build a supervisor and simulate the overall supervisory control architecture.