

Coursework 2 – Transient Response Improvement through Controller Design (Approx. time 5 hrs)

The aim of this work is to design a controller to improve the transient response for the position control of a lift system. The system's uncompensated open loop transfer function is given by:

$$G(s) = \frac{K(s+1)}{(s+1)(s+2)(s+3)}$$

The position control system is a unity feedback gain closed loop system. Calculate the value of the gain K and the dominant poles for the uncompensated system to achieve the damping ratio given in the Appendix, demonstrating that these poles are on the root locus and indicating the result graphically on a root locus plot.

The specification for the system asks for an underdamped response, with an overshoot and response time to ensure the passengers do not feel uncomfortable, and steady state error corresponding to its application. Select and justify the desired performance characteristics.

Design a lead-lag compensator to achieve your requirements for the system, reporting the important steps within the process.

Finally, compare the new system response with that of the original system, reflecting on the appropriateness for the application.

Submission

You are expected to submit a document of maximum 2 pages – any additional pages will be ignored. Ensure your name and candidate number are on the document. Your document is to be submitted through Blackboard, submission closes on Friday 20th April at 5 pm GMT.

Appendix

Candidate Nos.		ζ
From	To	
10206	34175	0.4
34176	35487	0.45
35488	38153	0.5
38154	39560	0.55
39561	67382	0.6