Automated Signal Analysis Report

Department of Electrical Engineering

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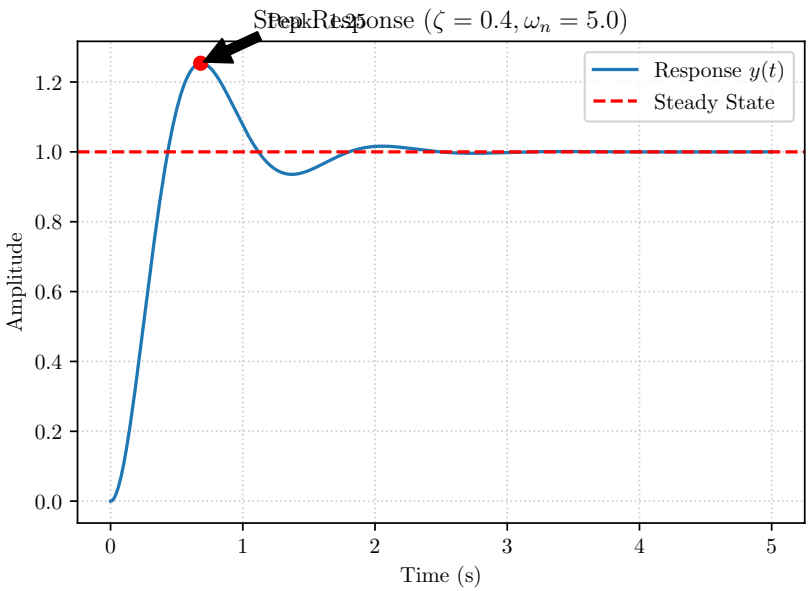
1 Computational Environment Initialization

To ensure consistency across all figures and calculations, we initialize the Python environment globally. This block imports necessary libraries and configures the plotting backend.

2 System Step Response Analysis

We analyze a second-order system defined by the transfer function:

$$H(s) = \frac{\omega_n^2}{s^2 + 2\zeta\omega_n s + \omega_n^2} \tag{1}$$



The simulation results indicate a peak amplitude of 1.2538 occurring at $t = 0.681\,\text{s}$. The calculated percentage overshoot is 25.38%.

This dynamic reporting ensures that if the damping ratio ζ is modified in the source code (e.g., increased to 0.8), the overshoot value in the text and the plot will update synchronously upon recompilation.