MAE 438 Homework 1

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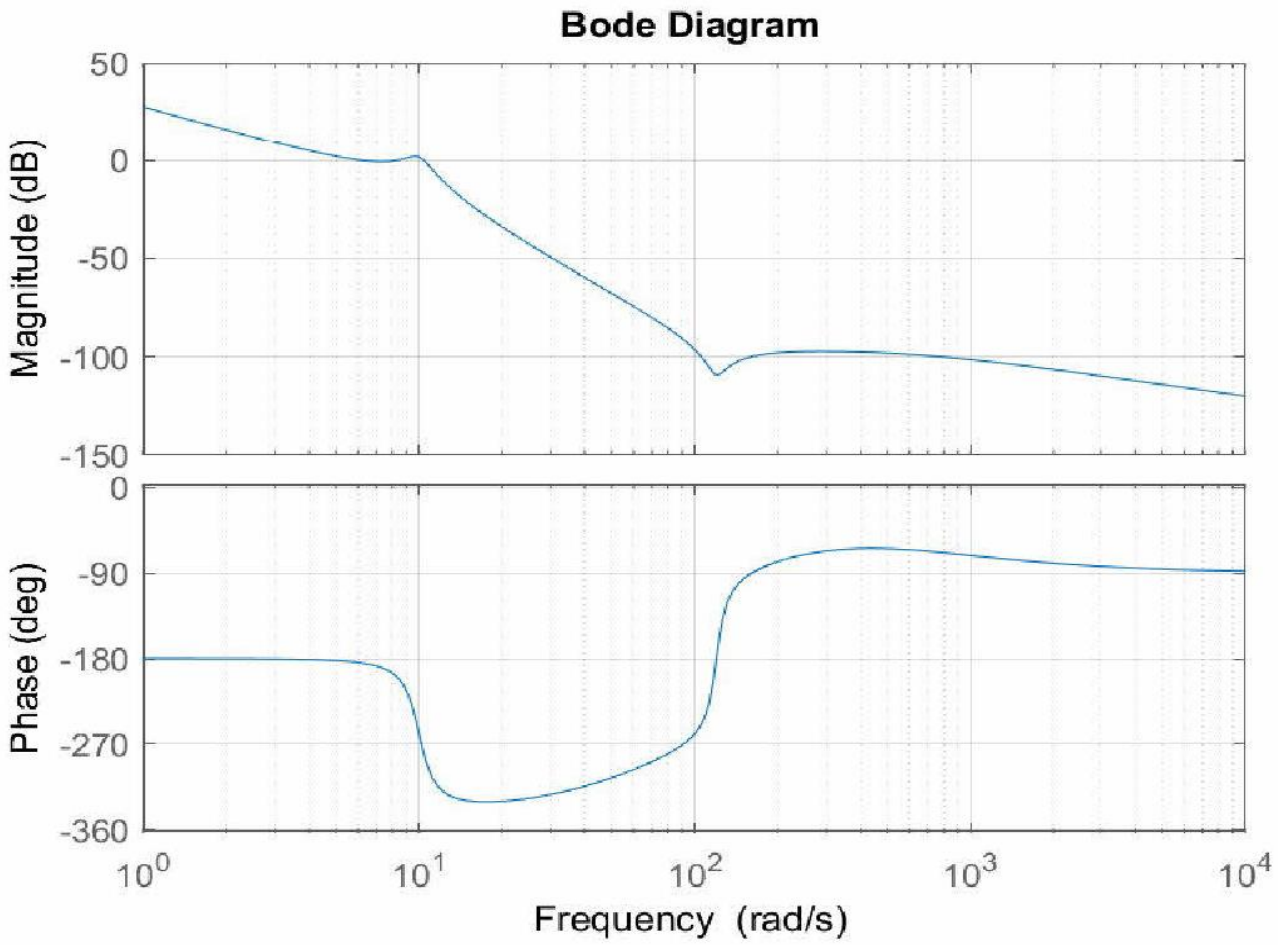
January 20, 2022



TRANSFER FUNCTION

$$G(s) = \frac{1.831e\text{-}07\ s^4 + 3.908e\text{-}05\ s^3 + 0.004795\ s^2 + 0.5496\ s + 23.99}{1.739e\text{-}05\ s^5 + 0.01004\ s^4 + 0.02211\ s^3 + s^2}$$

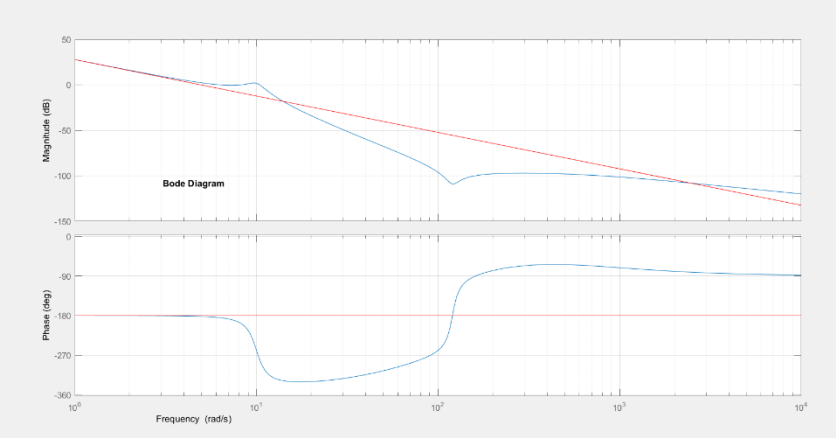
$$G(s) = \frac{0.010526\ (s + 130)\ (s + 70)\ (s^2\ +\ 13.46s\ +\ 1.44e04)}{s^2\ (s + 575)\ (s^2\ +\ 2.037s\ +\ 100)}$$

Kb = 23.9883

Zeros: 70, 130, -6.73-119.8j, -6.73+119.8j

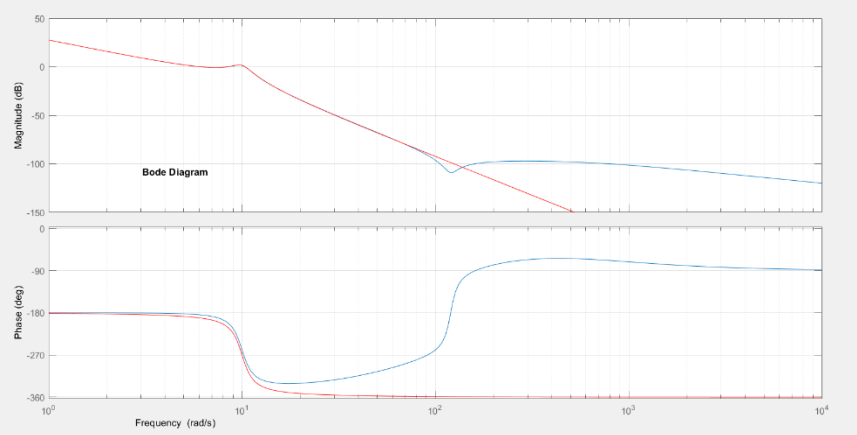
Poles: 0, 0, 575, -1.0185-9.948j, -1.0185+9.948j

Gain and double pole at origin



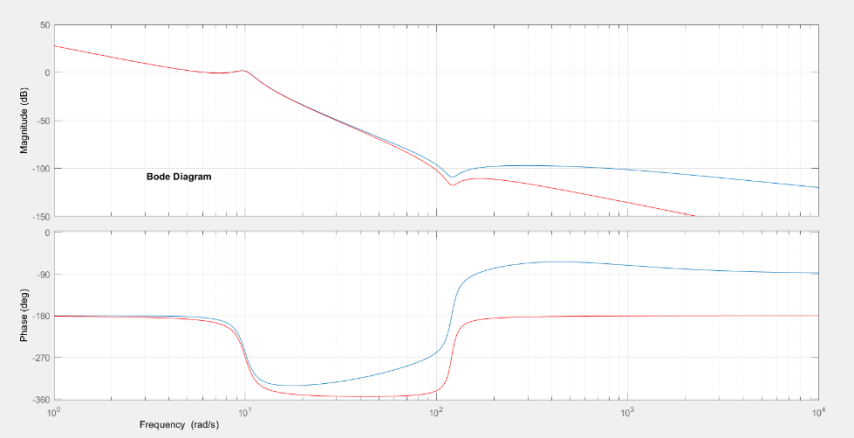
Complex pole at 10 rad/s

ζ = 0.01429

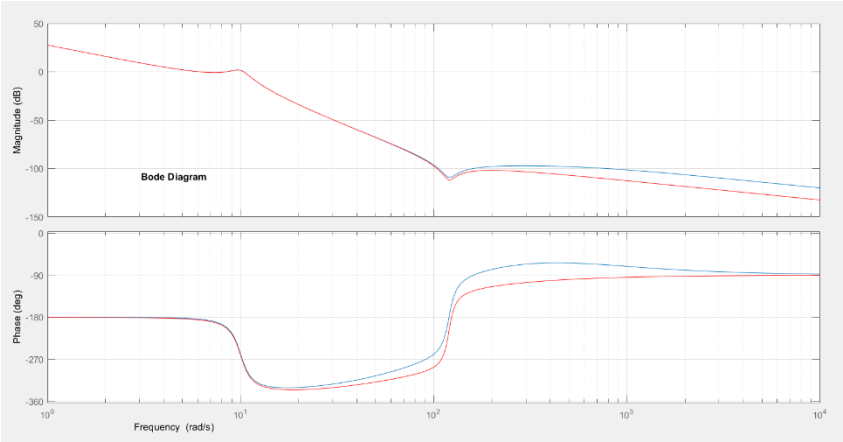


Complex zero at 120 rad/s

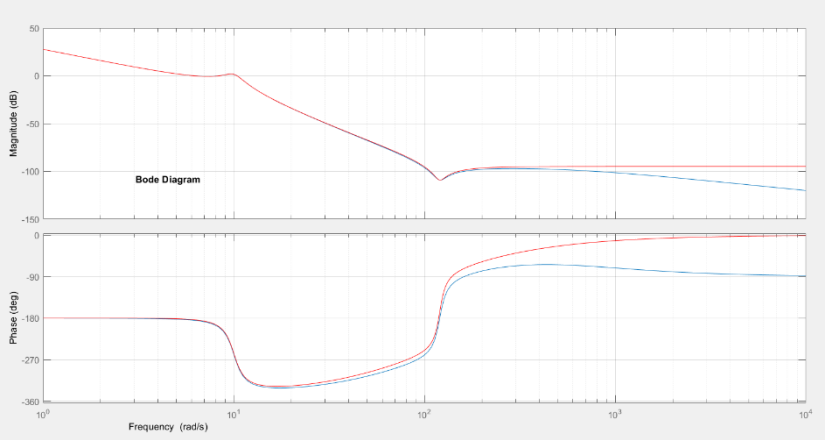
ζ = 0.0077



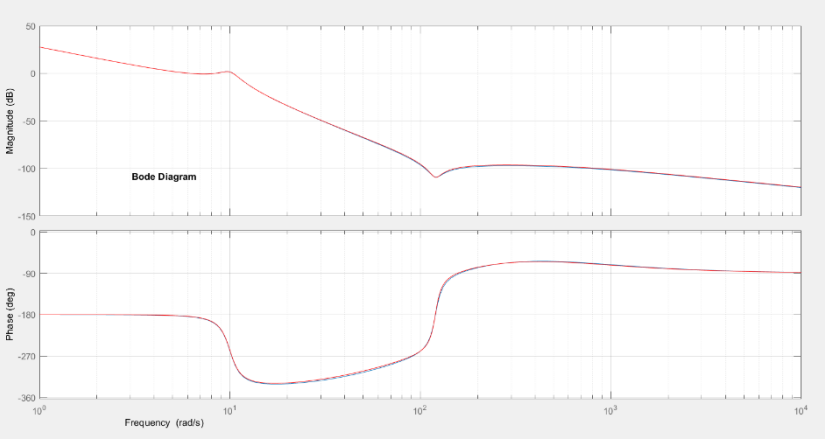
Zero at 70 rad/s



Zero at 130 rad/s



Pole at 575 rad/s



Final Result