

MAGNITUDE AND PHASE RESPONSE OF FUNCTION IN S

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GIVEN A GENERAL FUNCTION IN S,

$$F(s) = \frac{a_n s^n + a_{n-1} s^{n-1} + \dots + a_0}{b_m s^m + b_{m-1} s^{m-1} + \dots + b_0}$$

FIND MAGNITUDE AND PHASE RESPONSE AT FREQUENCY OF ω .

① SUBSTITUTE $j\omega$ FOR S

$$F(s) = \frac{\dots - ja_7 s^7 - a_6 s^6 + ja_5 s^5 + a_4 s^4 - ja_3 s^3 - a_2 s^2 + ja_1 s + a_0}{\dots - jb_7 s^7 - b_6 s^6 + jb_5 s^5 + b_4 s^4 - jb_3 s^3 - b_2 s^2 + jb_1 s + b_0}$$

②

$$\text{Magnitude} = \frac{\sqrt{(\sum(\text{real } a))^2 + (\sum(\text{imaginary } a))^2}}{\sqrt{(\sum(\text{real } b))^2 + (\sum(\text{imaginary } b))^2}}$$

$$\text{Phase} = \arctan\left(\frac{\sum(\text{imag } a)}{\sum(\text{real } a)}\right) - \arctan\left(\frac{\sum(\text{imag } b)}{\sum(\text{real } b)}\right)$$