* 1. **Fractional double term zero**

Fractional zero transfer function is given by ) = ……(13)

Put s = jω, in equation (13) results into ) = ………(14)

Magnitude in dB is given by

|)| dB =20log

**Calculation procedure**

**= .**

=

=

Applying De Moivre’s theorem in above equation we get

…… (15)

Again, = …… (16)

Put equation (15) and (16) in (14) we get

) = + + ) + (j + j )

Magnitude, |T(jω)| = +

=

=

Now, magnitude in dB, |) | dB

= 20 log

In the sum , dominates at lower frequencies whereas dominates at higher frequencies. For approximation we consider = . Now, we obtain corner frequency, =.

Following approximation of magnitude is obtained:

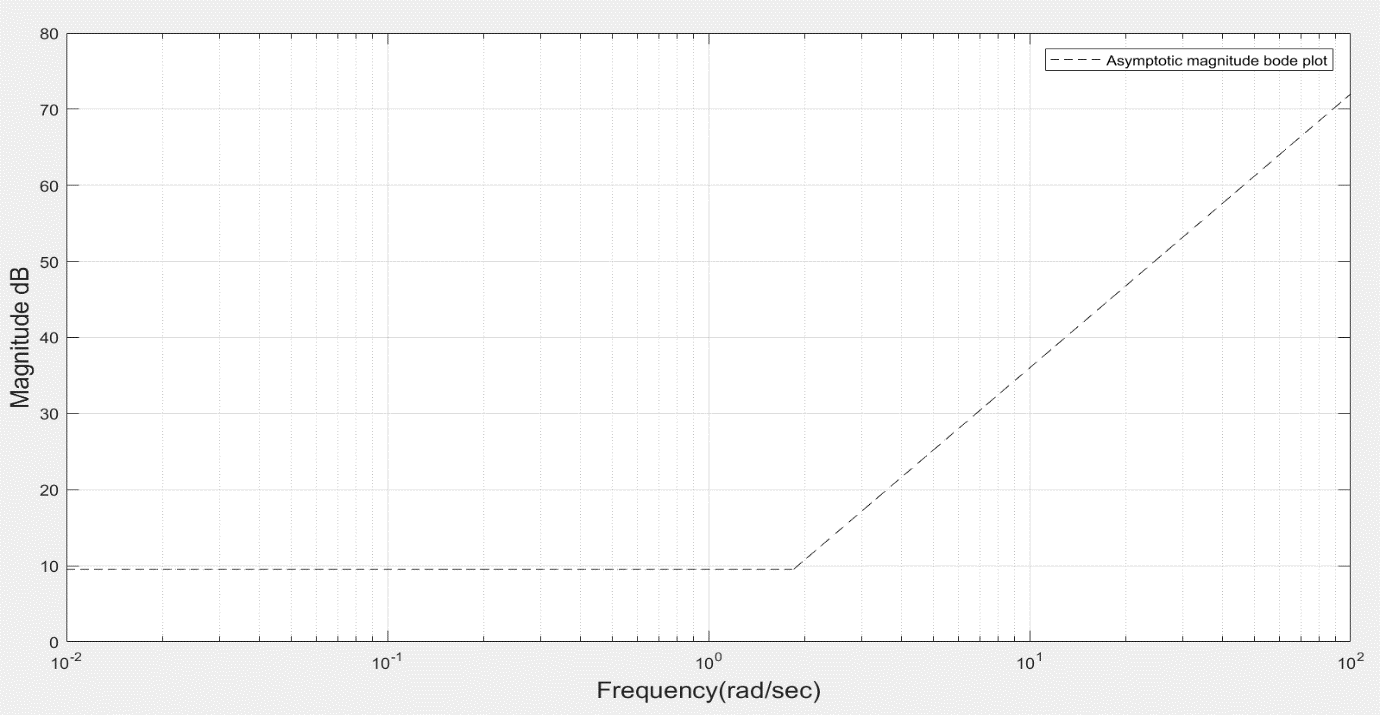
1. For ω ≤ , |) | dB = 20log||.
2. For ω >, |) | dB = 20(α+β) log ω.

**Procedure**

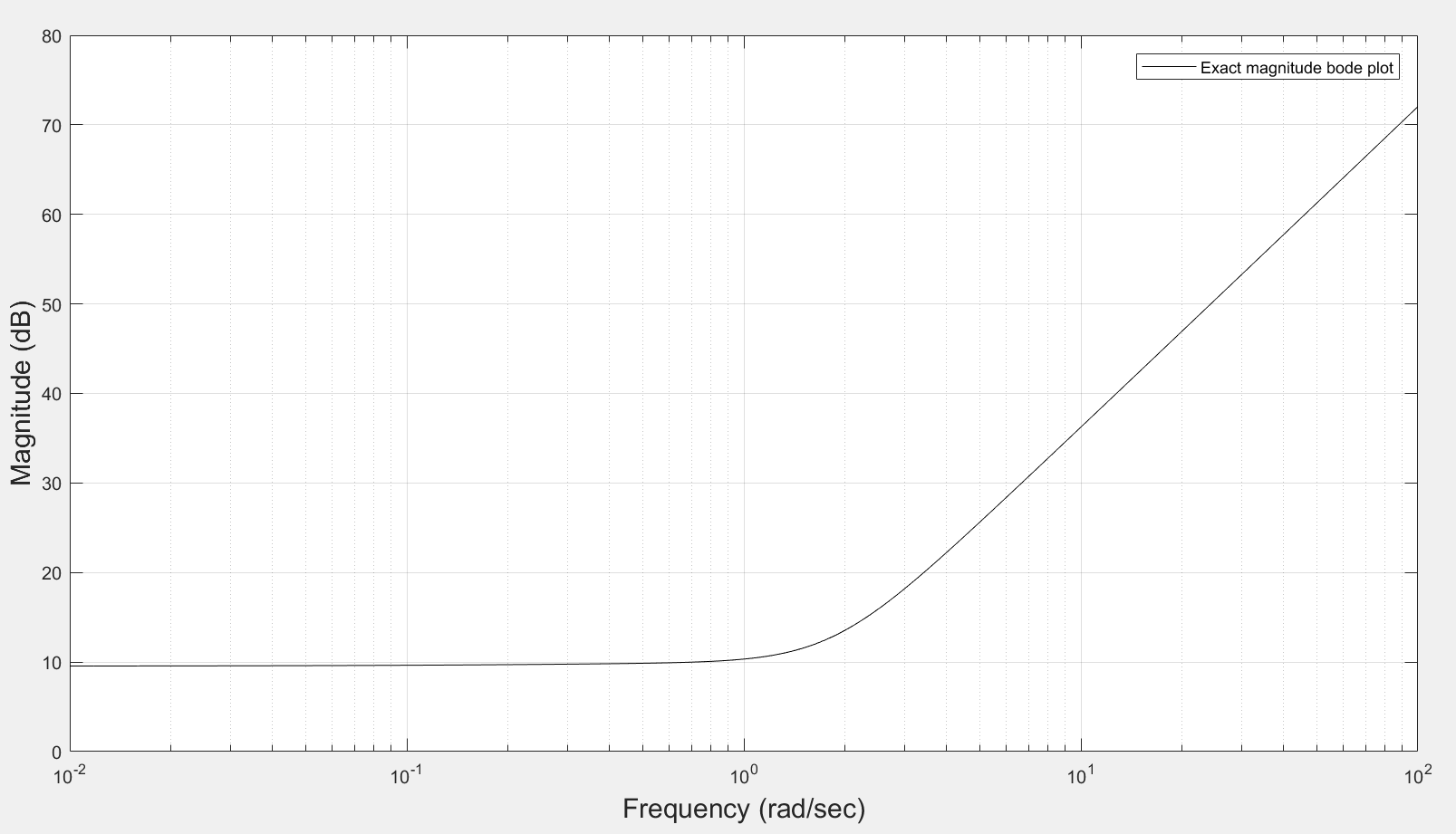
* Compute the corner frequency = and locate the point at magnitude 20log| |.
* Draw a slope 0 dB/decade for ω ≤ and a line with slope 20(α+β) dB/decade for

ω >

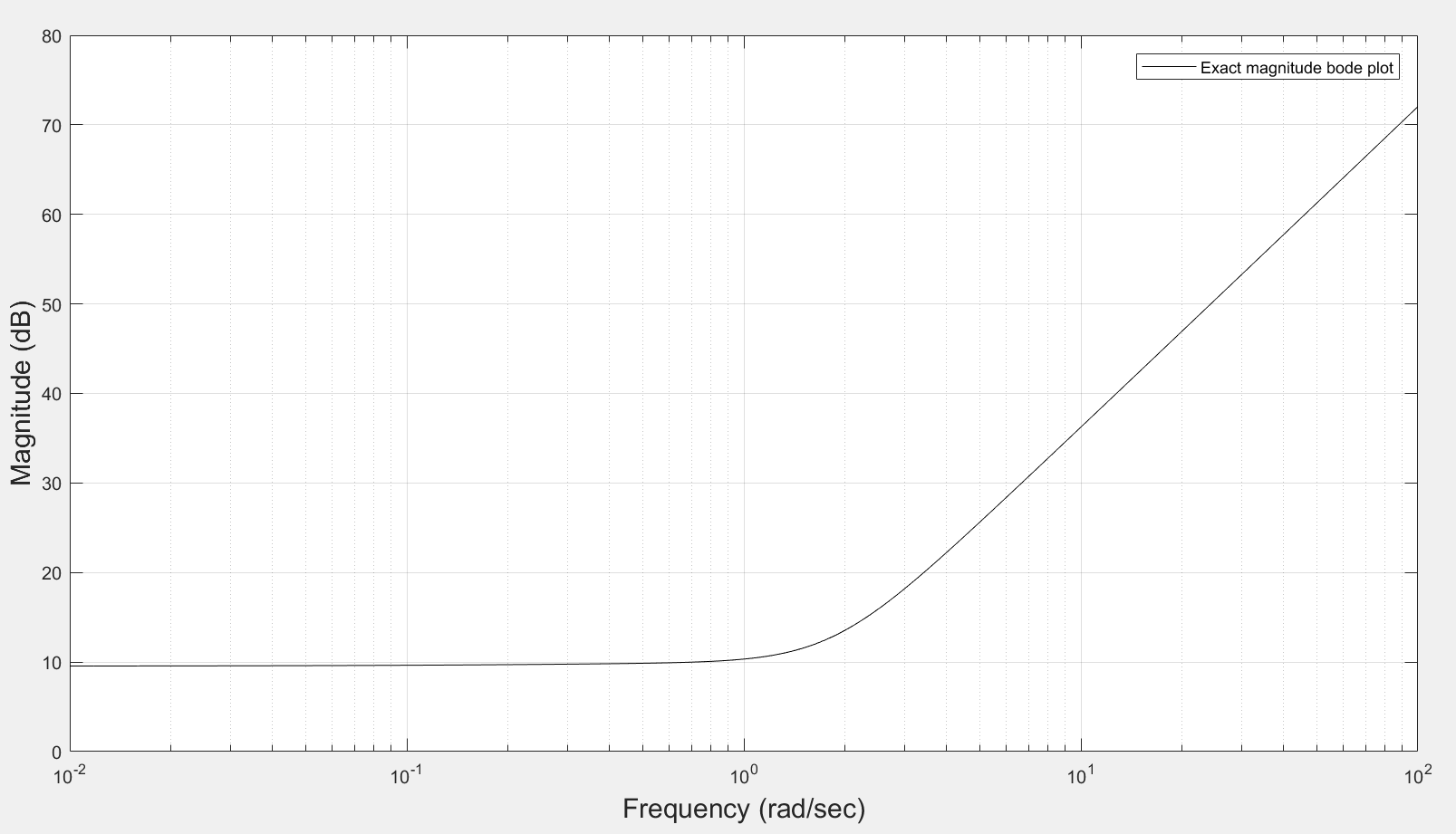
**Result:** Taking α = 0.9, β = 0.9, , 3 and 1.842.



**Figure 3.10- Asymptotic magnitude ode plot of fractional double term zero.**

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**Figure 3.11-Exact magnitude bode plot for fractional double term zero.**

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**Figure 3.12-Exact and asymptotic magnitude bode plot for fractional double term zero.**