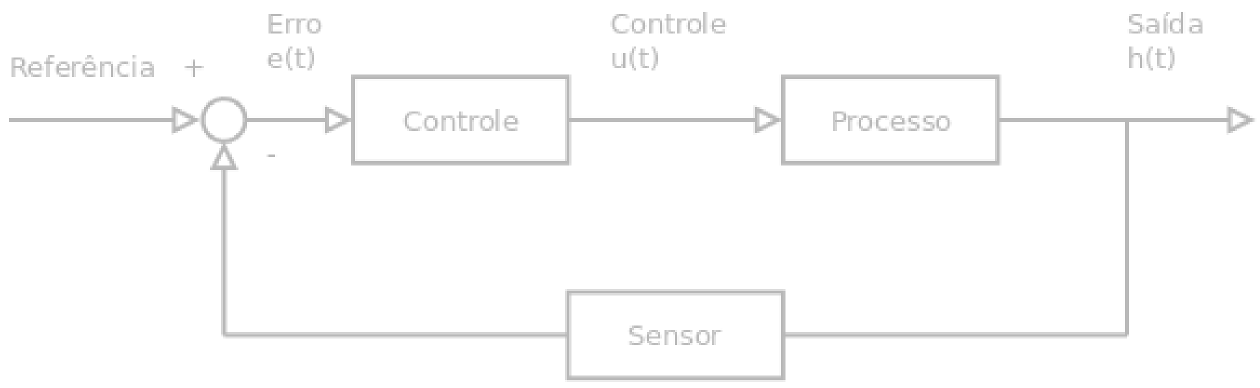
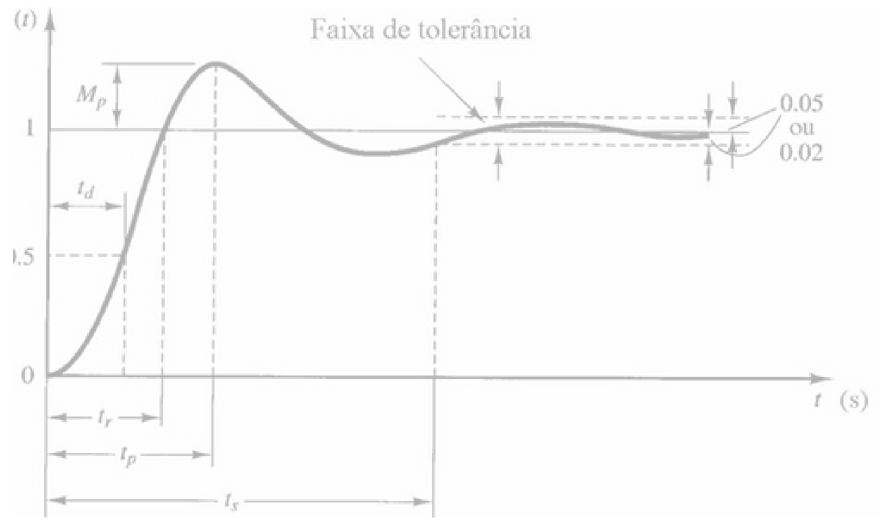


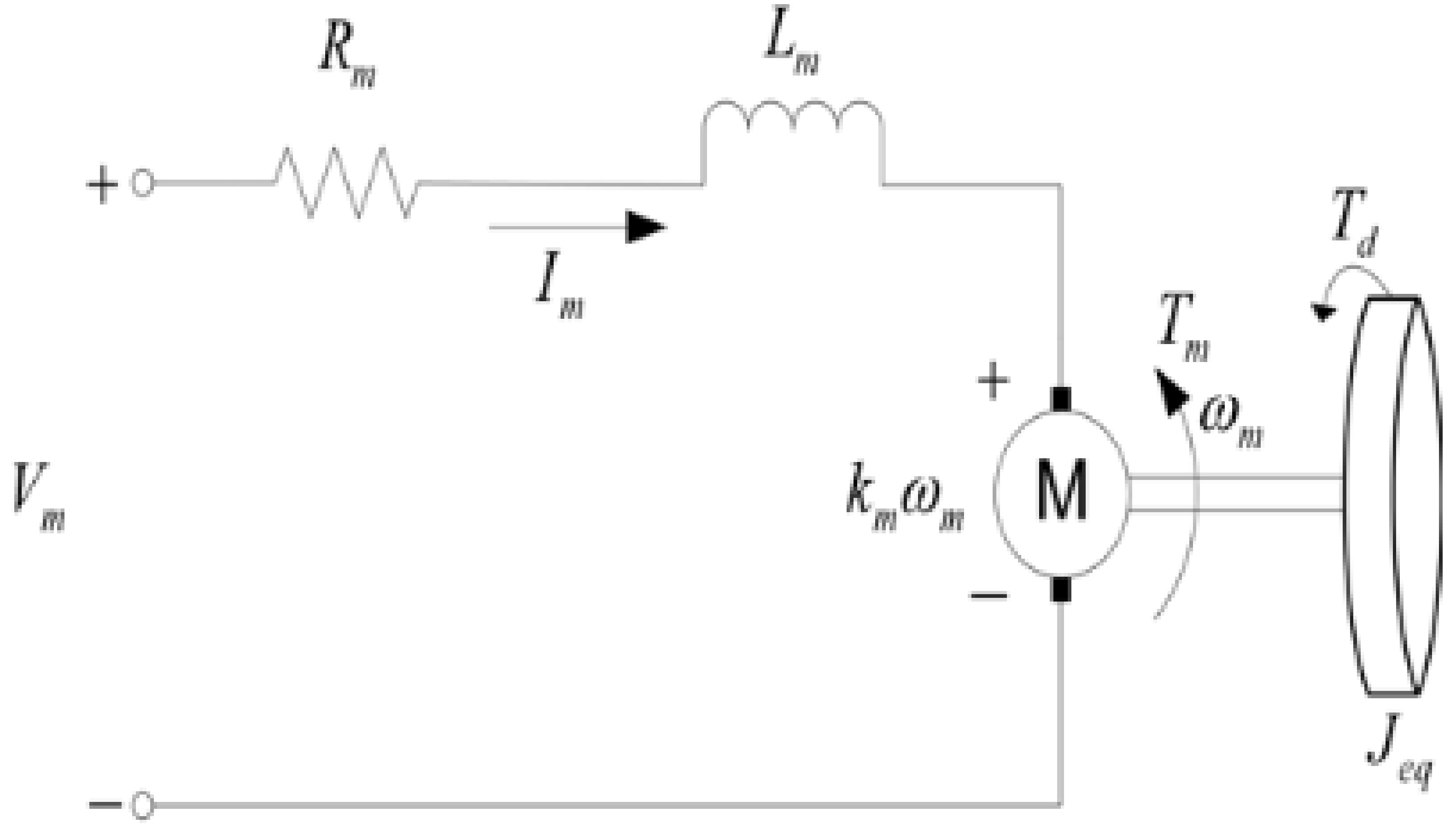


SISTEMAS DE CONTROLE II

- Douglas Wilian
- Gutembergue Ferreira
- Jeffet Matheus
- Pedro Artur
- Roger José

APRESENTAÇÃO DO PROBLEMA

- Controle da planta



CENÁRIO 1 - MODELAGEM

- CONTROLE DE VELOCIDADE DO MOTOR

  - 1 $$v_m(t) - R_m i_m(t) - L\frac{di(t)}{dt} - k_m \omega_m(t) = 0$$

  - 2 $$\tau(t) = k_m i_m(t)$$
    $$\dot{\tau}(t) = k_m \dot{i}_m(t)$$

  - 3

$$\tau(t) = J_{eq}\omega_m(t) + b\omega_m(t) \longrightarrow b = \frac{J_m}{\tau_m}$$

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CENÁRIO 1 - MODELAGEM

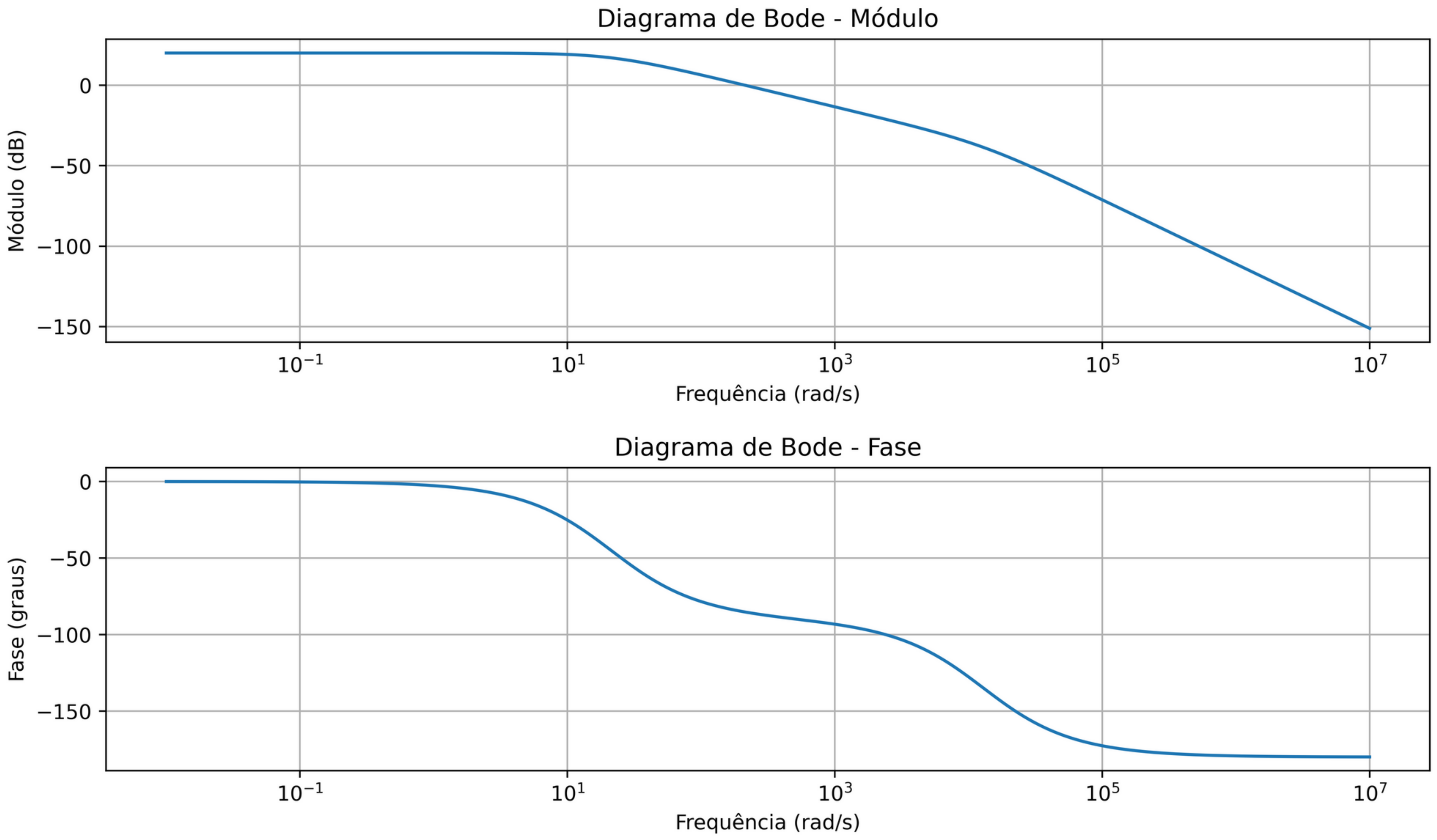
- CONTROLE DE VELOCIDADE DO MOTOR

$$v_m(t) = (3,6053 \times 10^{-7})\ddot{\omega}_m(t) + (4,6643 \times 10^{-3})\dot{\omega}_m(t) + (9,9188 \times 10^{-2})\omega(t)$$

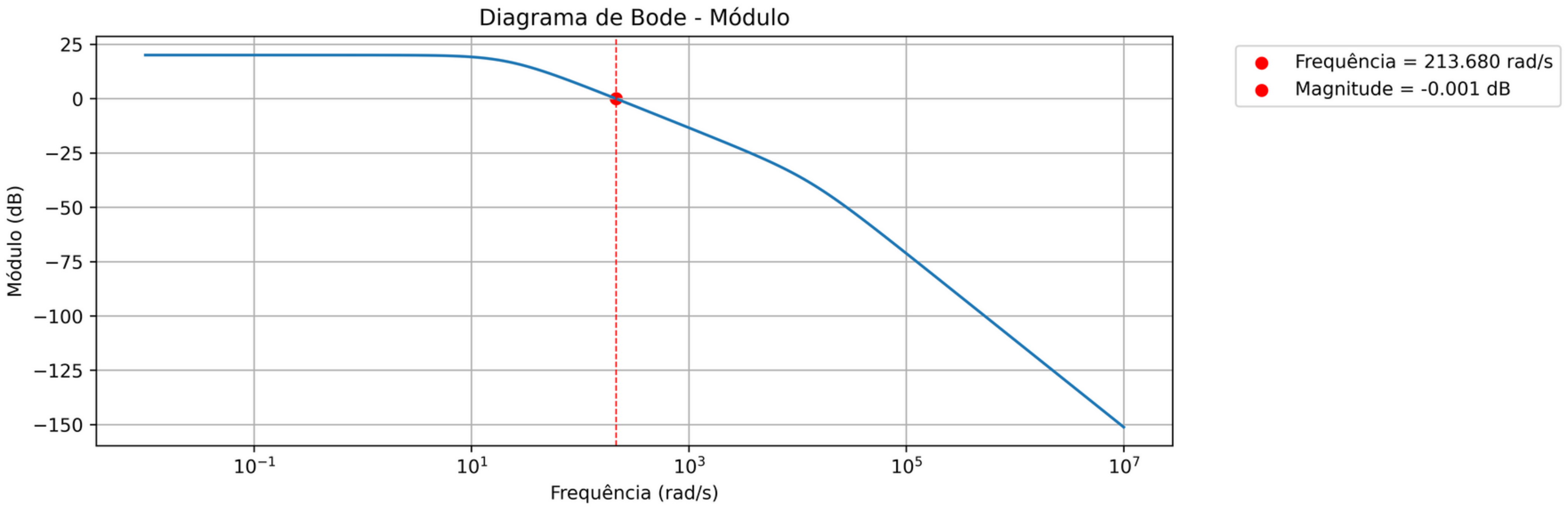
- FUNÇÃO DE TRANSFERÊNCIA

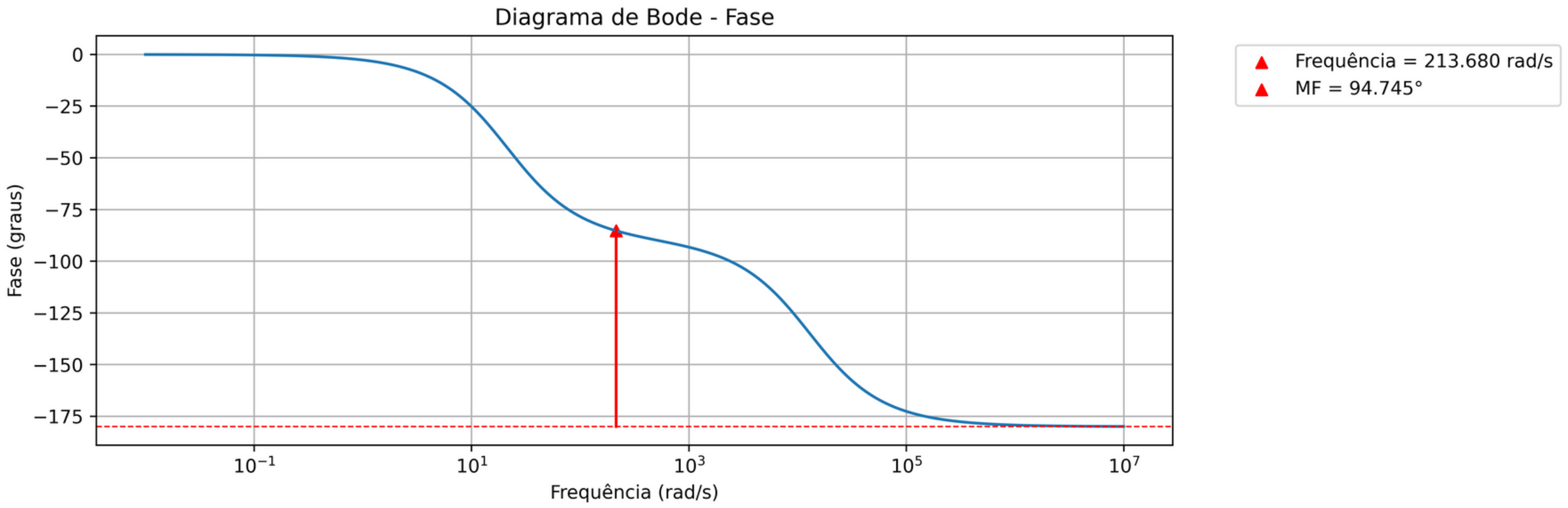
$$G_p(s) = \frac{2,7737 \times 10^6}{(s + 21,3)(s + 12916,04)}$$

CENÁRIO 1 - PARÂMETROS DO CONTROLADOR



CENÁRIO 1 - PARÂMETROS DO CONTROLADOR





CENÁRIO 1 - PARÂMETROS DO CONTROLADOR

$$G_c(s) = \frac{\frac{K_C}{4T_D}(2T_D s + 1)^2}{s}$$

- Condições necessárias:

$$\angle G_c(j\omega cg) = \phi_f - \phi_i$$

$$|G_c(j\omega_{cg})||G_p(j\omega_{cg})| = 1$$

CENÁRIO 1 - PARÂMETROS DO CONTROLADOR

$$\angle \frac{\frac{K_C}{4T_D}(2T_D j\omega_{cg} + 1)^2}{j\omega_{cg}} = \phi_f - \phi_i \implies 2\tan^{-1}(2T_D\omega_{cg}) - 90^\circ = \phi_f - \phi_i$$

$$T_D = \frac{\tan(47,6275)}{427,36} \implies \boxed{T_D = 0,002565}$$

$$\frac{|\frac{K_C}{4T_D}(2T_D j\omega_{cg} + 1)^2|}{|j\omega_{cg}|} \cdot \frac{|2,7737 \times 10^6|}{|(j\omega_{cg} + 21,3)(j\omega_{cg} + 12916,04)|} = 1$$

CENÁRIO 1 - PARÂMETROS DO CONTROLADOR

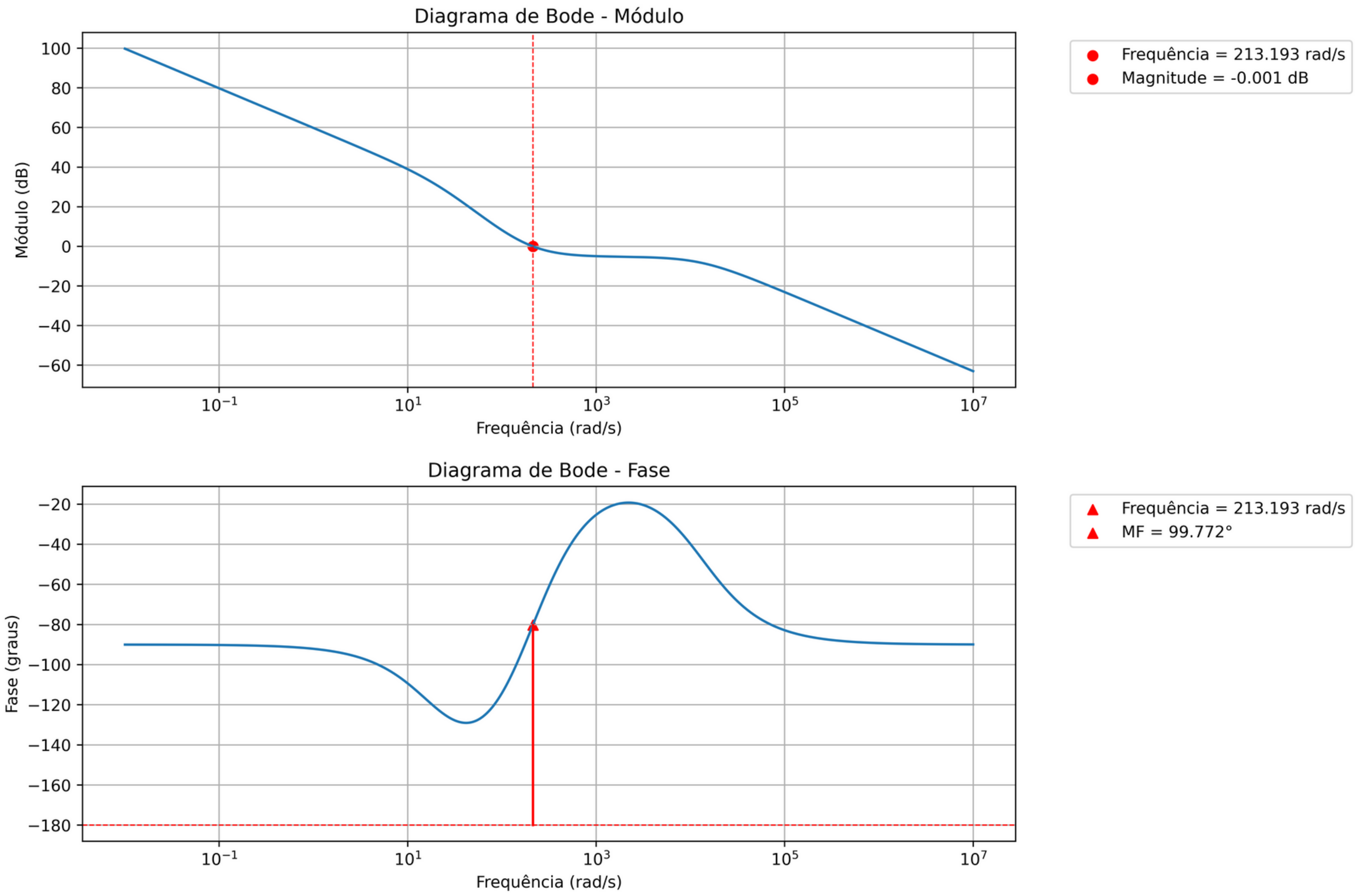
$$\frac{\frac{K_C}{4T_D}(4T_d^2\omega_{cg}^2+1)}{\omega_{cg}} = \frac{\sqrt{\omega_{cg}^2+21,3^2}\cdot\sqrt{\omega_{cg}^2+12916,04^2}}{2,7737\times10^6}$$

$$\boxed{K_C = 0,9959}$$

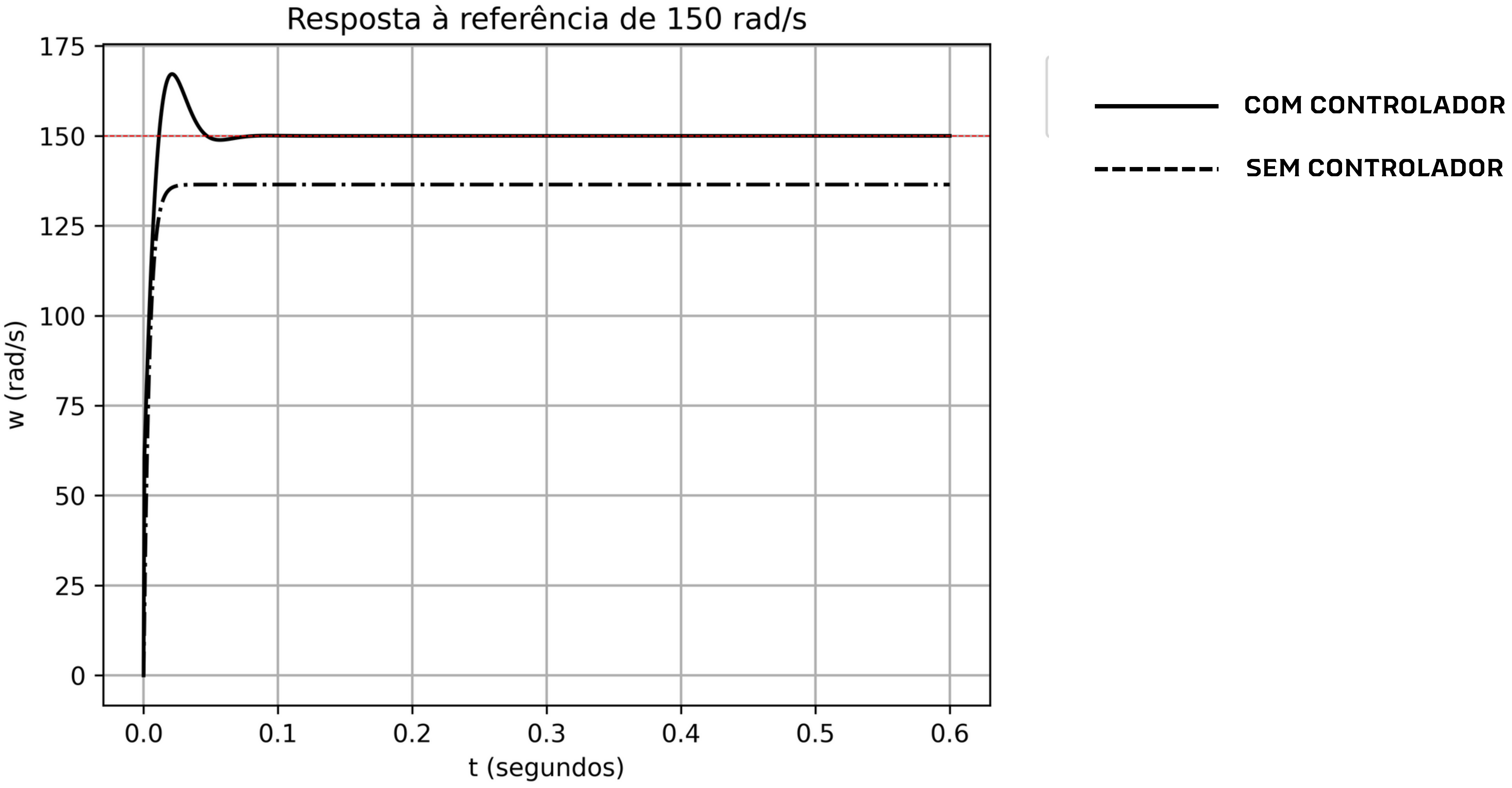
- Planta do PID:

$$G_c(s) = \frac{0,0025445s^2+0,993959s+97,06628}{s}$$

CENÁRIO 1 - RESPOSTA DO SISTEMA

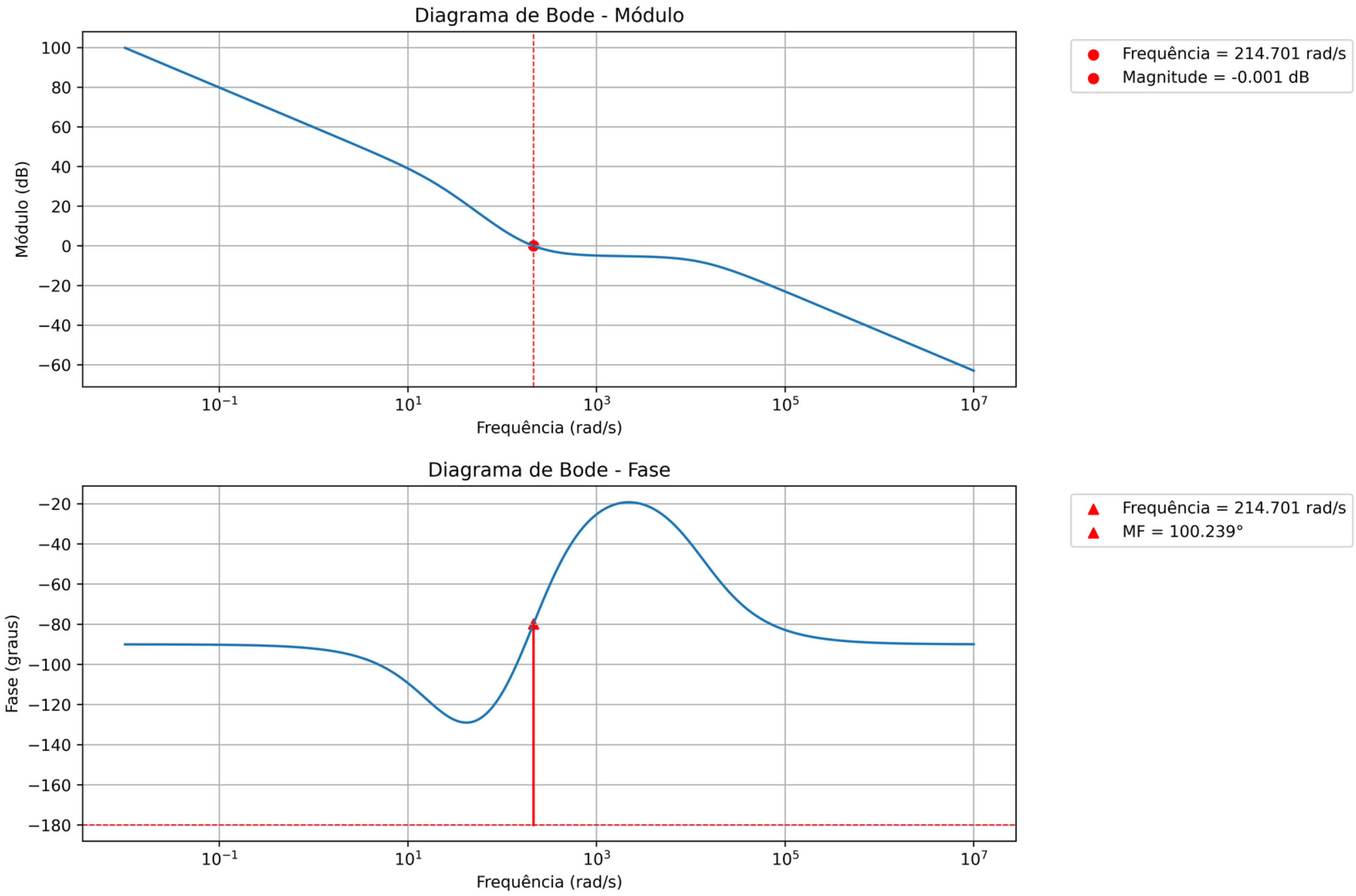


CENÁRIO 1 - RESPOSTA TEMPORAL



CENÁRIO 1 - RESPOSTA DO SISTEMA

- AJUSTE KC = 1:



CENÁRIO 2 - MODELAGEM

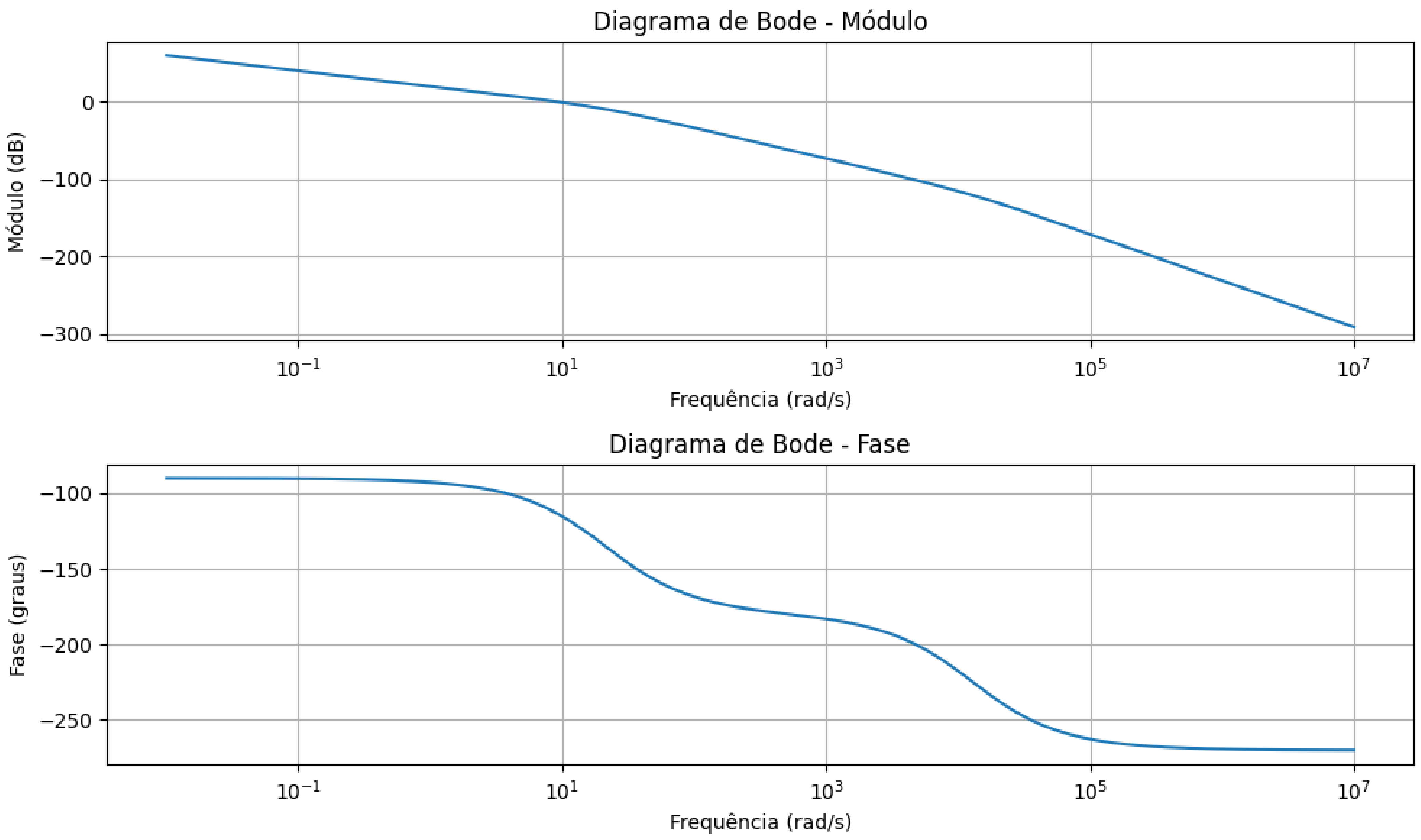
- CONTROLE DA POSIÇÃO DO MOTOR
  - 1 $$G_p(s) = \frac{2,7737 \times 10^6}{(s + 21,3)(s + 12916,04)}$$
  - 2 $$\omega_m(t) = \dot{\theta}_m(t) \longrightarrow \frac{\Theta_s(s)}{W_m(s)} = \frac{1}{s}$$
  - 3 $$G_p(s) = \frac{\Theta_s(s)}{W_m(s)} \cdot \frac{W_m(s)}{V_m(s)} = \frac{2,7737 \times 10^6}{s(s + 21,3)(s + 12916,04)}$$

CENÁRIO 2 - ERRO DE REGIME

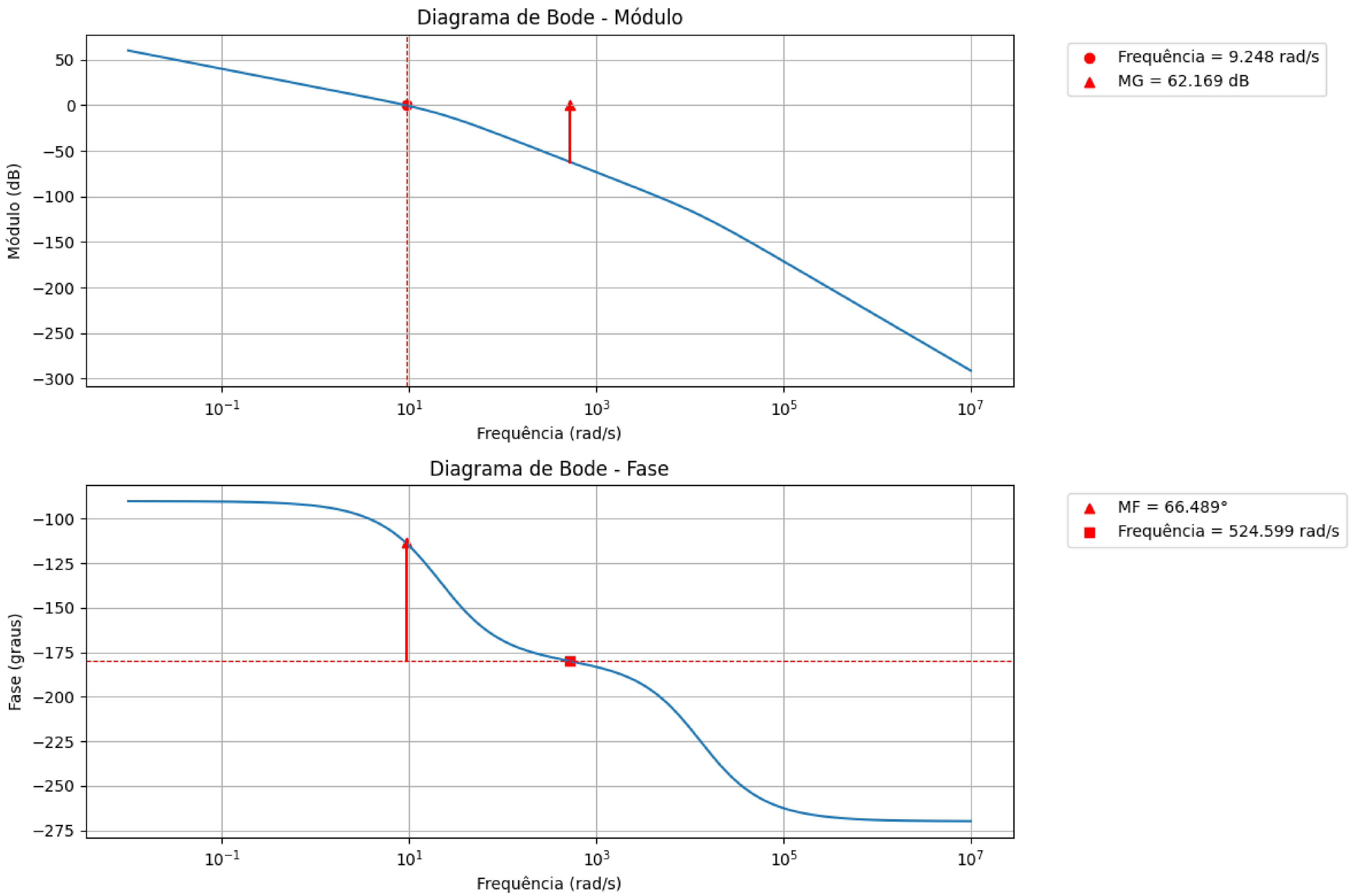
$$G_p(s) = \frac{\Theta_s(s)}{W_m(s)} \cdot \frac{W_m(s)}{V_m(s)} = \frac{2,7737 \times 10^6}{s(s+21,3)(s+12916,04)}$$

- FUNÇÃO DE TRANSFERÊNCIA DO TIPO 1
- $e(\infty) = \lim_{s \to 0} s \dfrac{R(s)}{1+G_p(s)}$
- ERRO DE REGIME É NULO

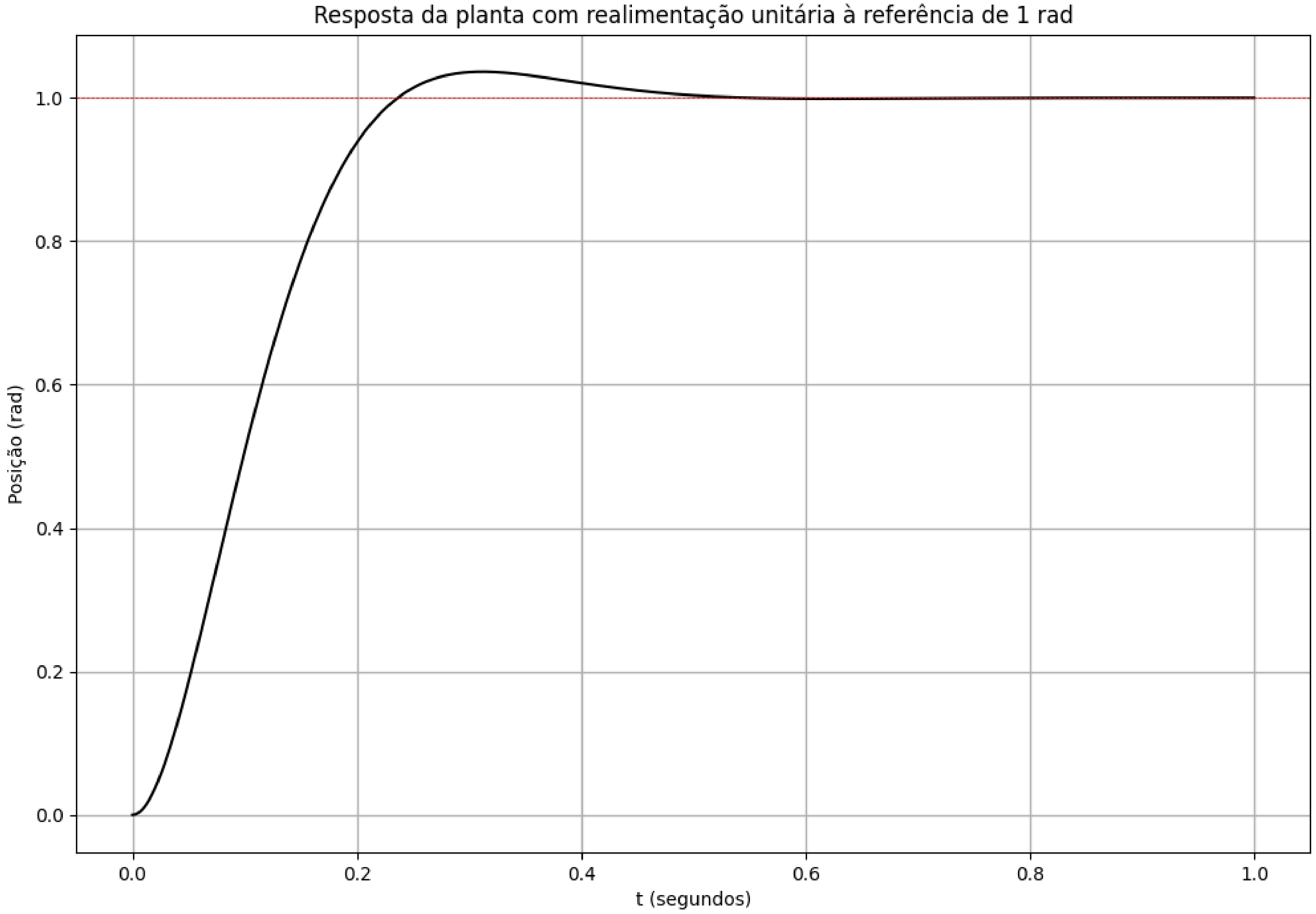
CENÁRIO 2 - PARÂMETROS DA PLANTA



CENÁRIO 2 - PARÂMETROS DA PLANTA



CENÁRIO 2 - REALIMENTAÇÃO NEGATIVA



OBRIGADO A TODOS!

DÚVIDAS?