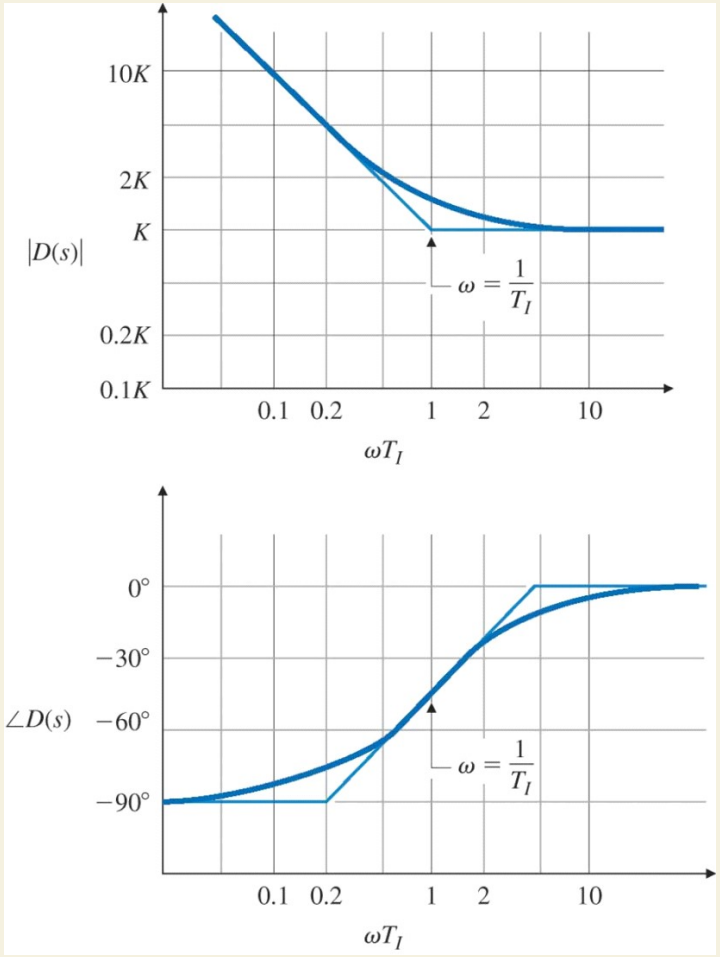
TE055

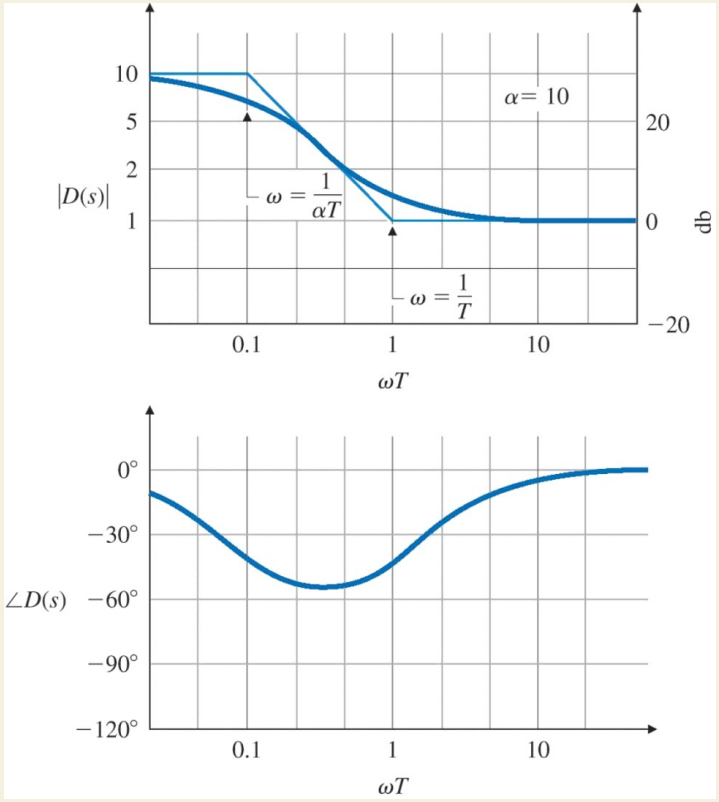
Projeto de controladores no domínio da frequência 2

Profª Juliana L. M. Iamamura

Controlador PI



Controlador de atraso de fase



Exemplo 1: Controlador de atraso de fase

Requisitos:

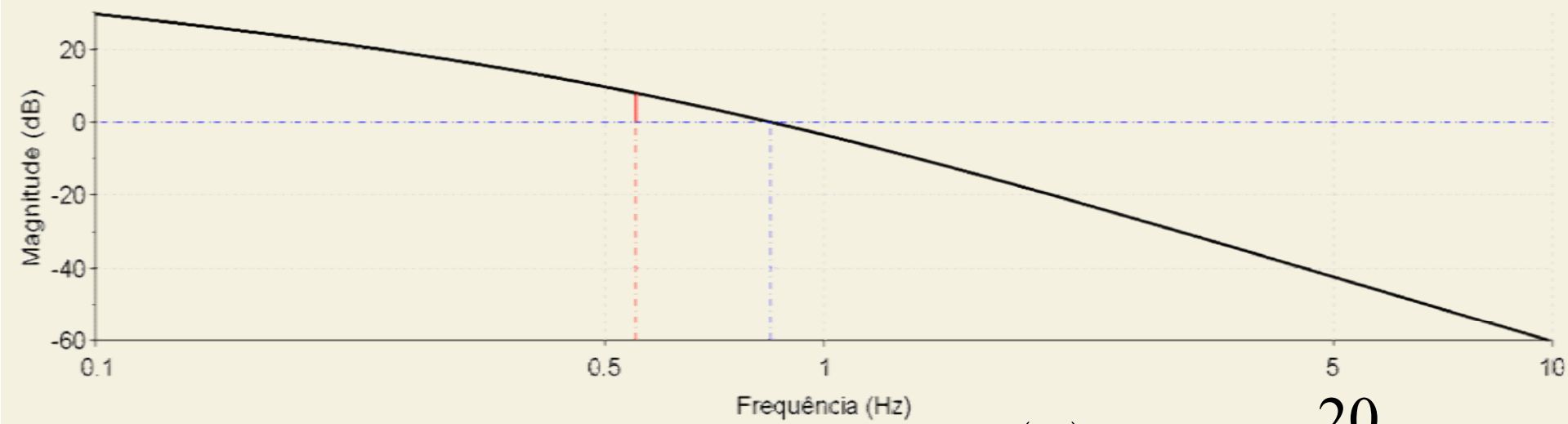
$K_v \geq 20$

$MF = 45^o \pm 5^o$

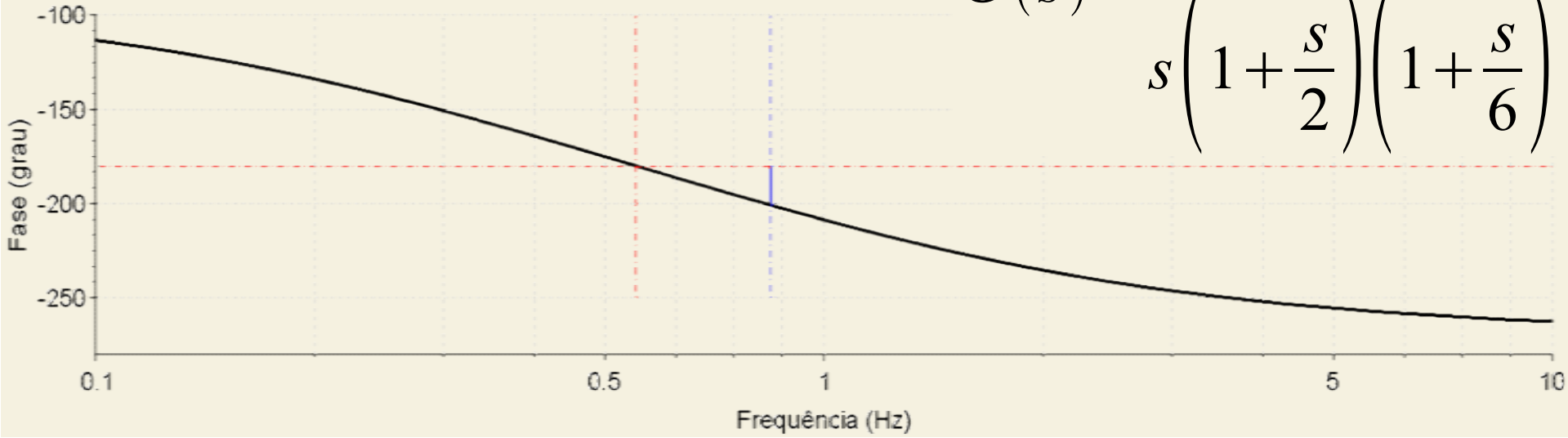
$\omega_c \geq 1$ rad/s

$$G(s) = \frac{2}{s\left(1+\frac{s}{2}\right)\left(1+\frac{s}{6}\right)}$$

Exemplo 1: Controlador de atraso de fase



$$G(s)=\frac{20}{s\left(1+\frac{s}{2}\right)\left(1+\frac{s}{6}\right)}$$



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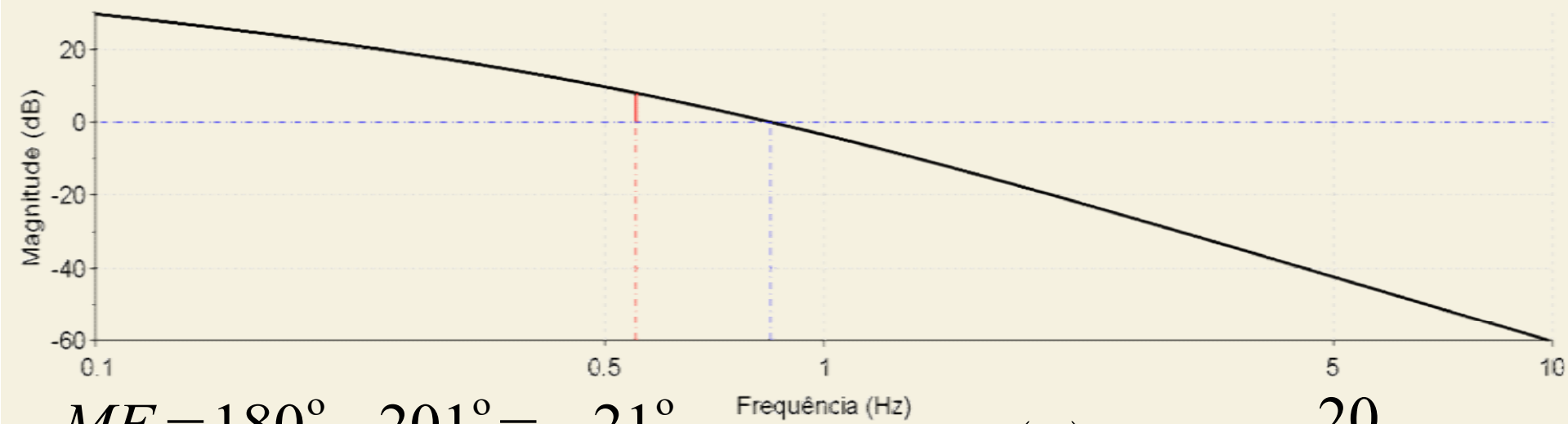
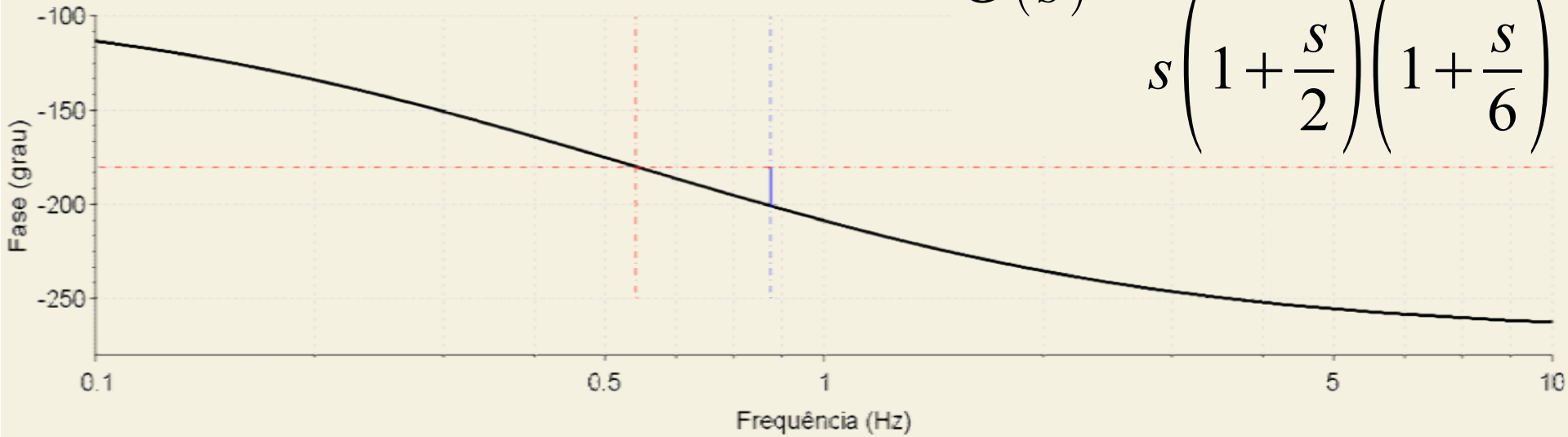


$$MF = 180^{\circ} - 201^{\circ} = -21^{\circ}$$

$$G(s) = \frac{20}{s\left(1+\frac{s}{2}\right)\left(1+\frac{s}{6}\right)}$$



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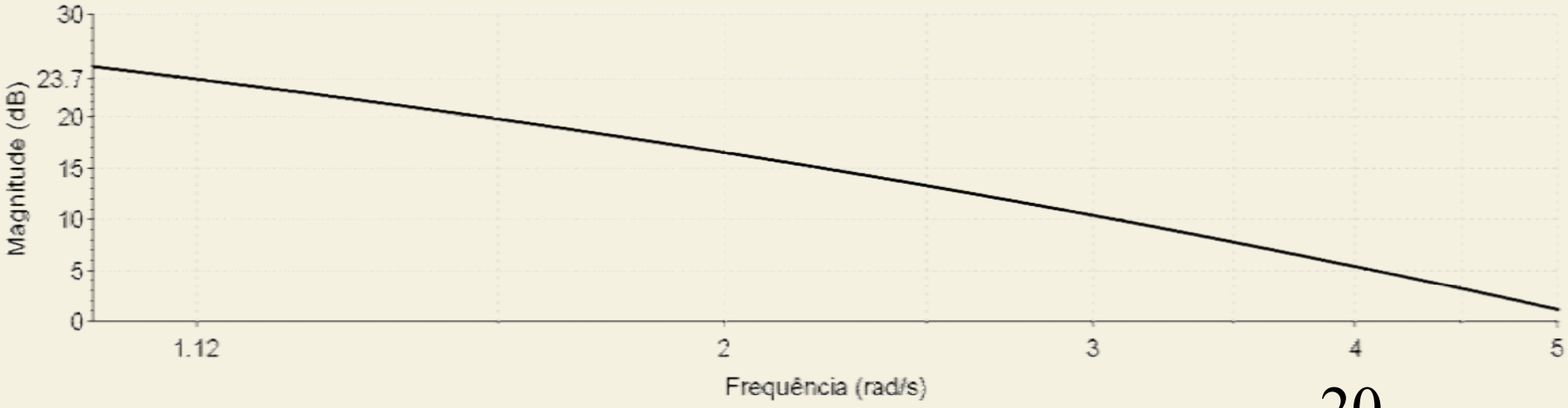
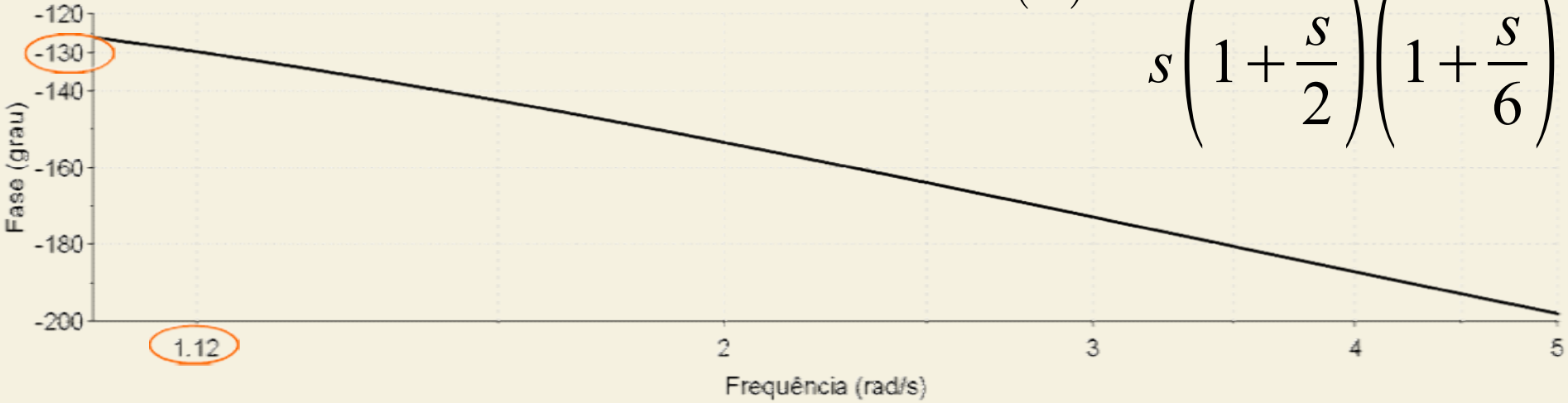


$$G(s)=\frac{20}{s\left(1+\frac{s}{2}\right)\left(1+\frac{s}{6}\right)}$$



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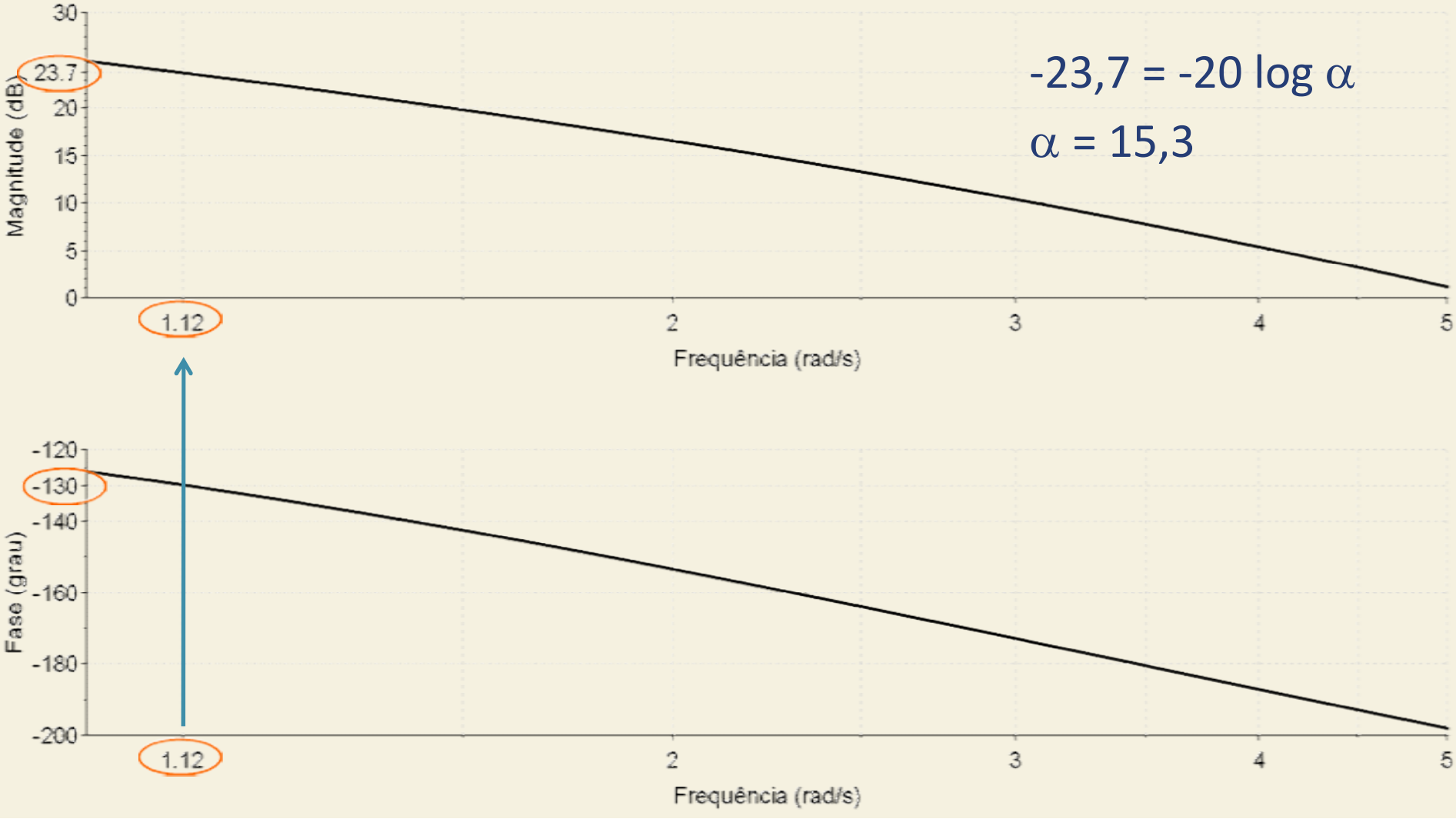
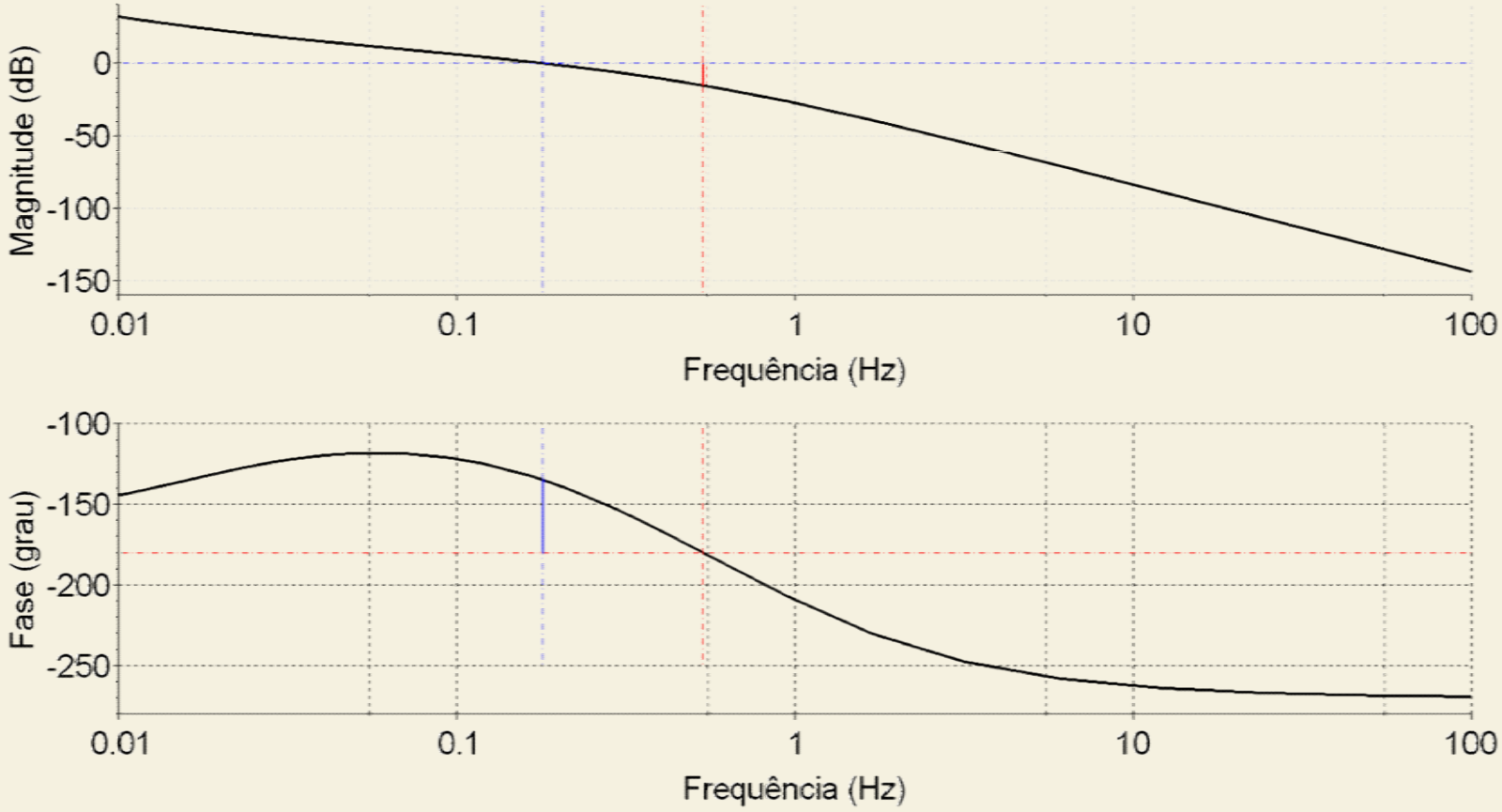


$-23,7 = -20 \log \alpha$

$\alpha = 15,3$

Exemplo 1: Controlador de atraso de fase

$$D(s)G(s) = \left(\frac{1+10s}{1+153s}\right)\left(\frac{20}{s\left(1+\frac{s}{2}\right)\left(1+\frac{s}{6}\right)}\right)$$

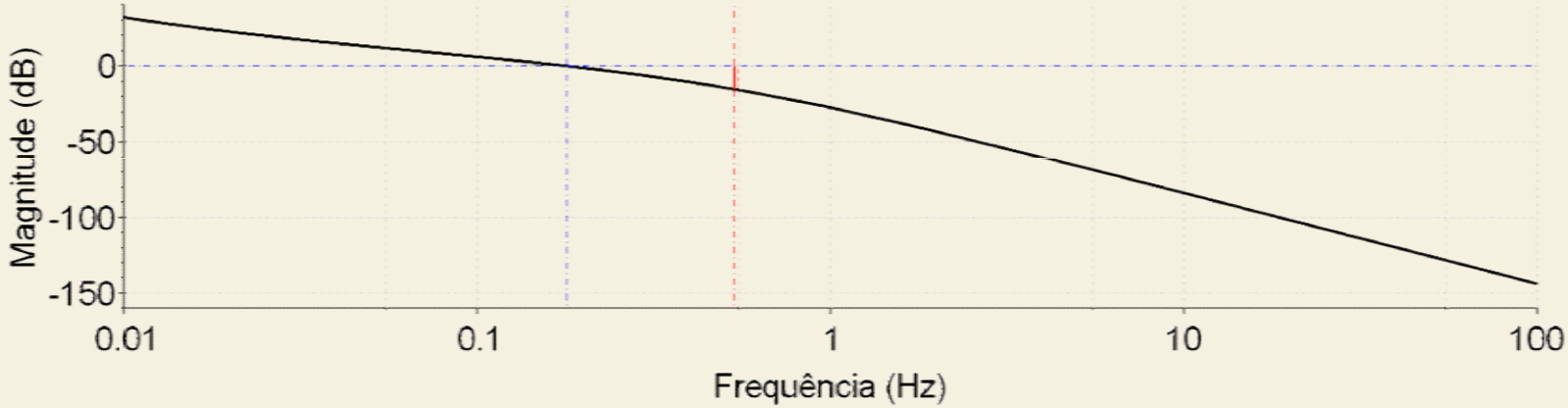


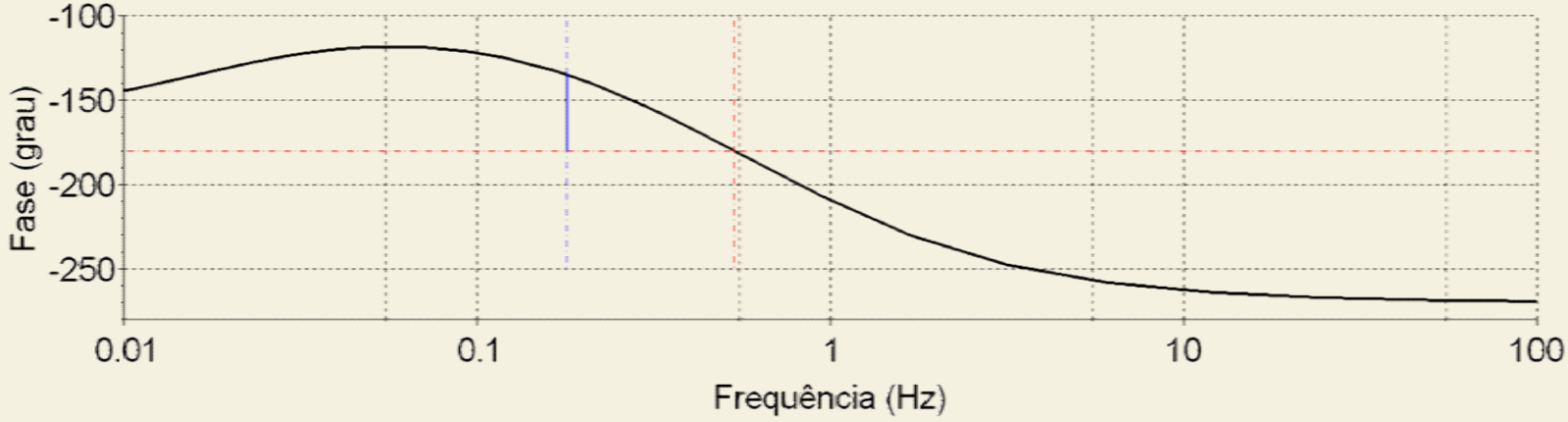
Exemplo 1: Controlador de atraso de fase

MF = 45,3º ✓

ω_c = 1,12 rad/s ✓

$$D(s)G(s) = \left(\frac{1+10s}{1+153s}\right)\left(\frac{20}{s\left(1+\frac{s}{2}\right)\left(1+\frac{s}{6}\right)}\right)$$





Exemplo 2: Controlador de atraso de fase

Requisitos:

$K_P \geq 4$

$MF \geq 45^o$

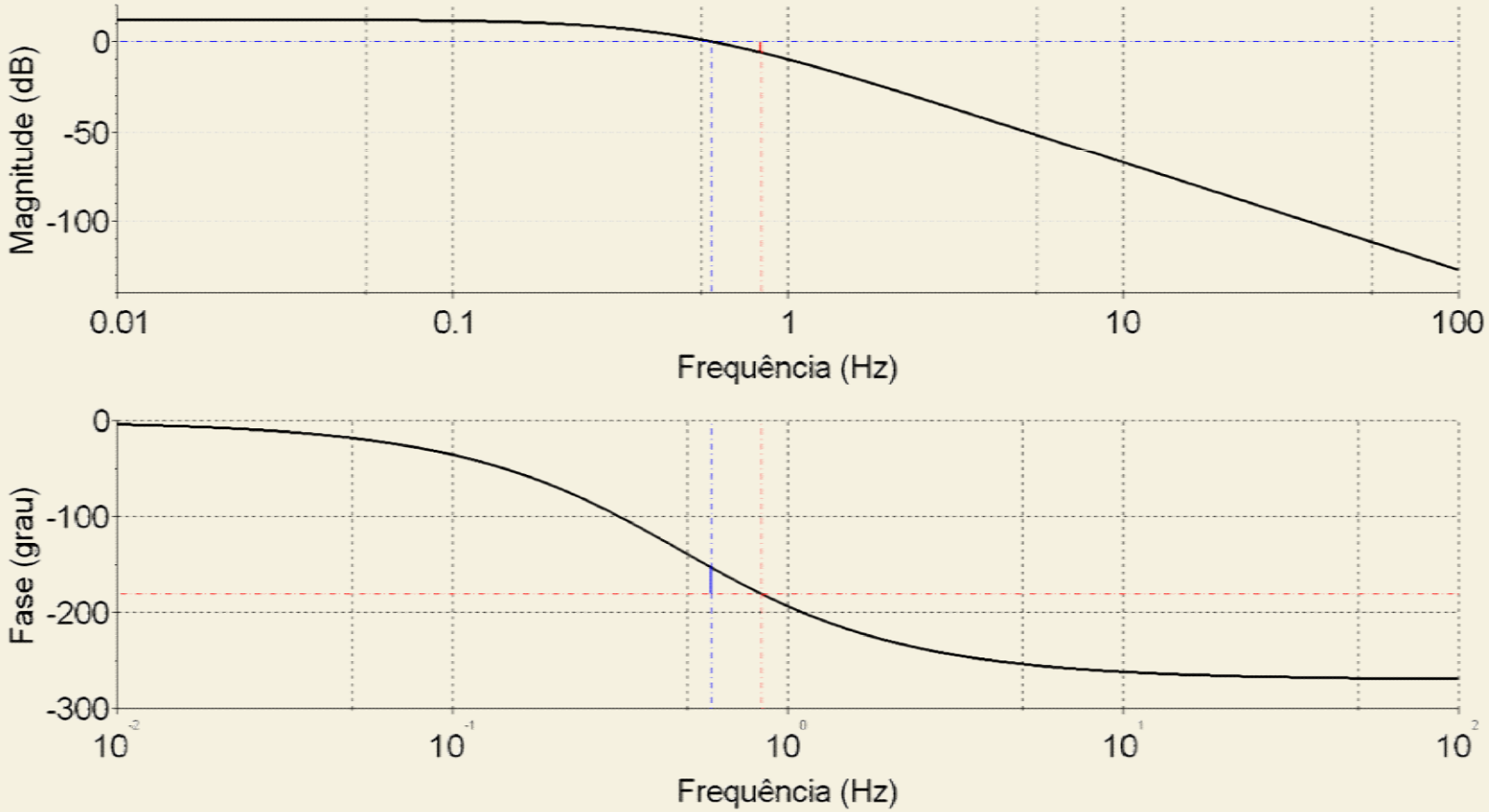
$MG \geq 2$ dB

$$G(s) = \frac{1}{\left(1 + \frac{s}{3}\right)^3}$$

Exemplo 2: Controlador de atraso de fase

$$G(s) = \frac{4}{\left(1 + \frac{s}{3}\right)^3}$$

MF = 27,1º



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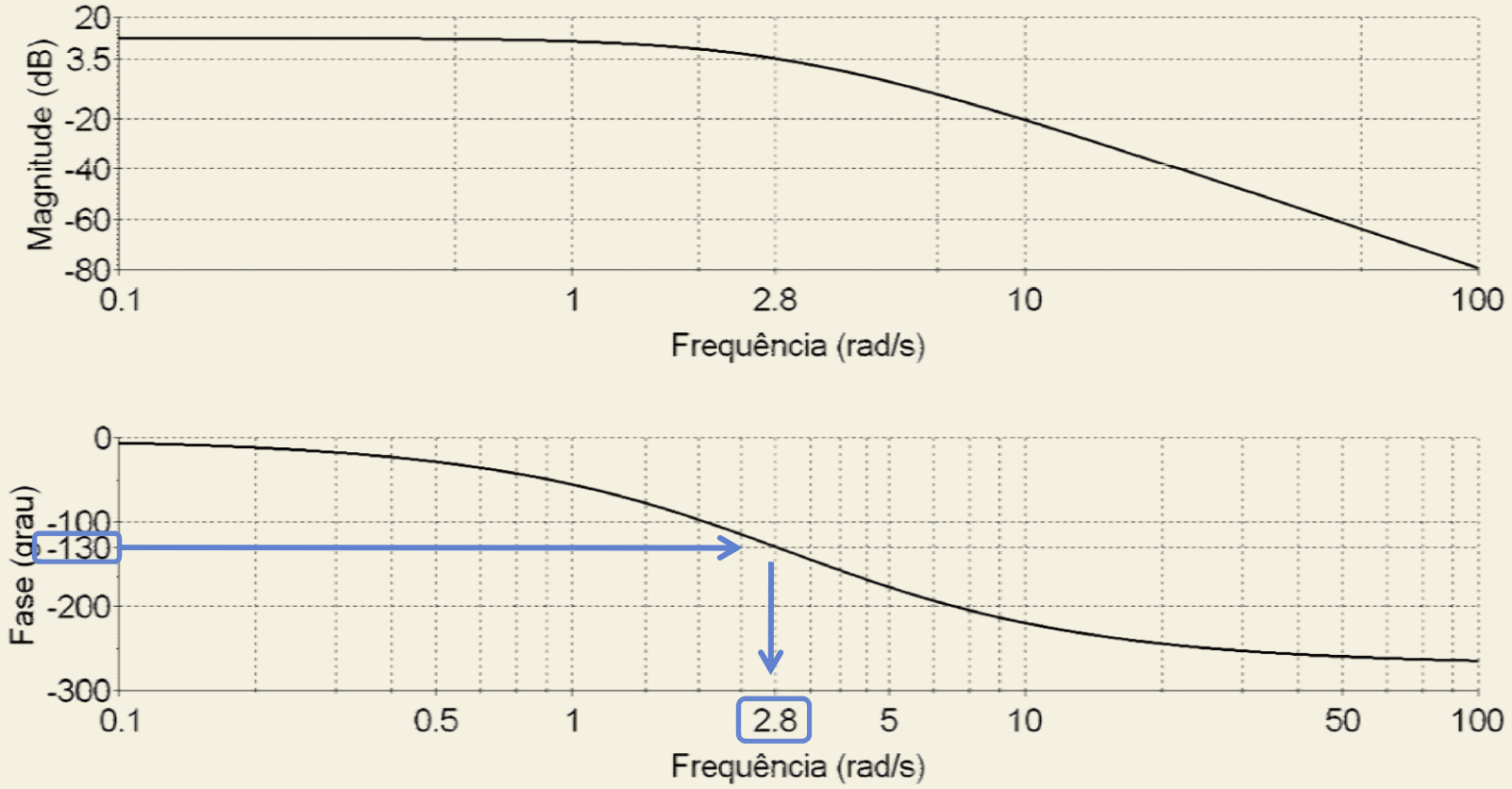
$$G(s) = \frac{4}{\left(1 + \frac{s}{3}\right)^3}$$



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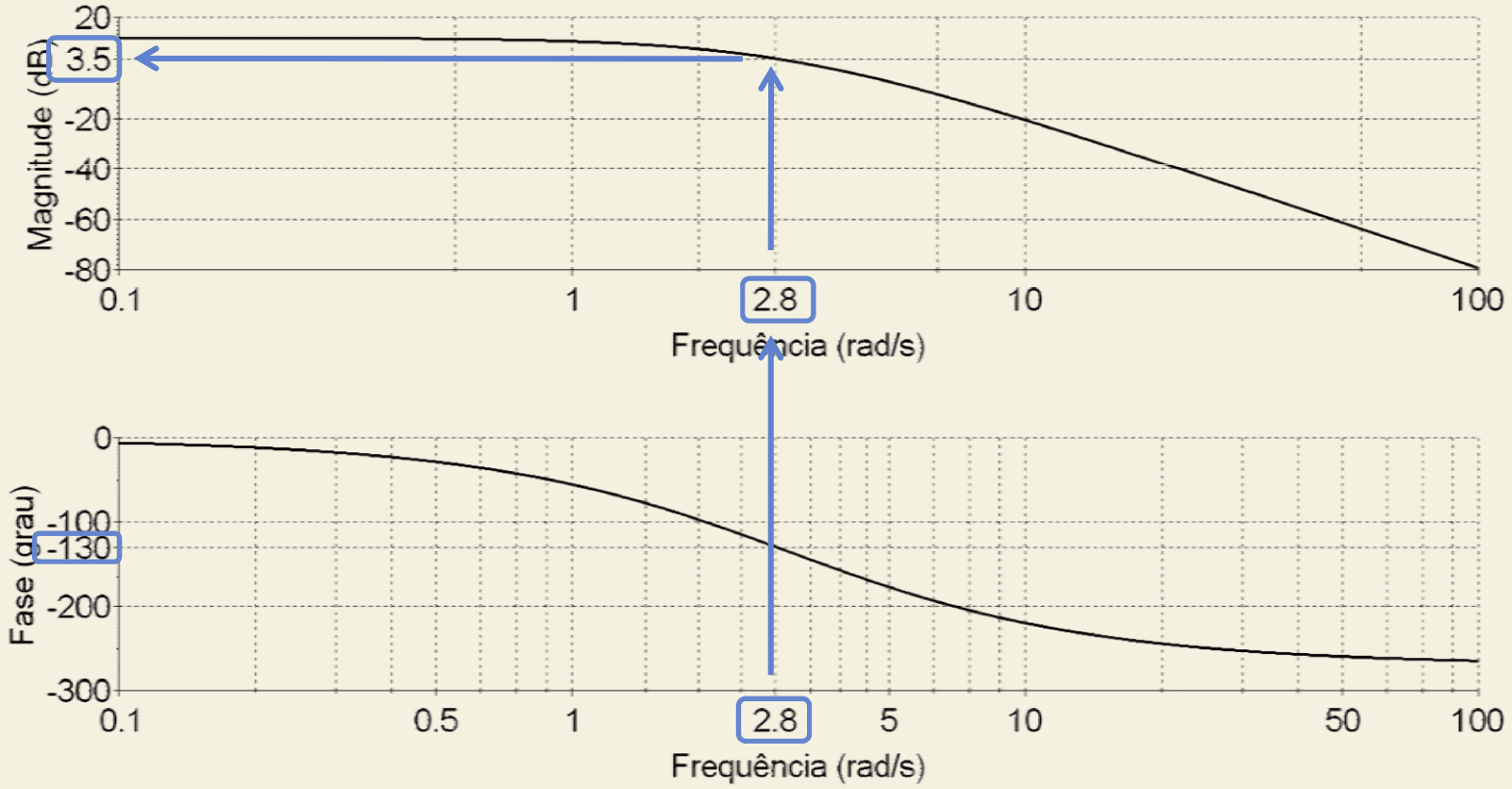
$$G(s) = \frac{4}{\left(1 + \frac{s}{3}\right)^3}$$



Exemplo 2: Controlador de atraso de fase

MF = 46,5º

MG = 9,3 dB

$$G(s)D(s) = \frac{4}{\left(1+\frac{s}{3}\right)^3}\left(\frac{1+3{,}57s}{1+5{,}36s}\right)$$