Problema curs 6

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1.

$$H(s)=\frac{1+s^2}{s^2+2s+1}$$

a) $1+s^2=0$ => $s^2=-1$ => s = ±i <– zerouri

$s^2+2s+1=0$ => $(1+s)^2=0$ => s1,2 = -1 <- pol de grad 2

b) Sistemul este strict extern stabil d.p.d.v. dinamic daca polii lui H(s) ϵ $C^{-¿}$
Cum s1,2 < 0 (polii sunt in semiplanul stang) => se respecta conditia.

c) Caracteristica de frecventa

s -> jw

$$H(jw)=\frac{1+(jw)^2}{(jw)^2+2jw+1}=\frac{1-w^2}{-w^2+2jw+1}$$

d) Caracteristica de amplitudine

$$H(w)=|H(jw)|=\sqrt{\frac{(1-w^2)^2}{(1-w^2)^2+4w^2}+\left(\frac{4w(1-w^2)}{(1-w^2)^2+4w^2}\right)^2}$$

e) Caracteristica de faza

$$f(w)=-\arctan wt$$

$$f(w)=pi+arctg\left(\frac{1}{w}\right)-arctg\frac{4w}{1-w^2}$$

f)Banda de frecventa

$$\frac{H(o)}{\sqrt{2}}=\frac{1}{wt^2+1}$$

H(0) = 1 => $\frac{1}{\sqrt{2}}=\frac{1}{wt^2+1}$

$$\frac{H(o)}{\sqrt{2}}=\sqrt{\frac{(1-w^2)^2}{(1-w^2)^2+4w^2}} \quad => \quad (1-w^2)^2=4w^2 \quad => \quad (1-w^2)=\pm 2w$$

Alegem doar componenta pozitiva.

$w^2+2w-1=0$, w> 0 = > $w=\sqrt{2}-1$

$f=\frac{w}{2pi}$ => B ϵ $\left[0,\frac{\sqrt{2}-1}{2pi}\right]$