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### Question: 4. Using the Routh-Hurwitz criterion, tell how many closed-lo...

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4. Using the Routh-Hurwitz criterion, tell how many closed-loop poles of the system shown in Figure 3 lie in the right half-plane and whether the system is stable or not.

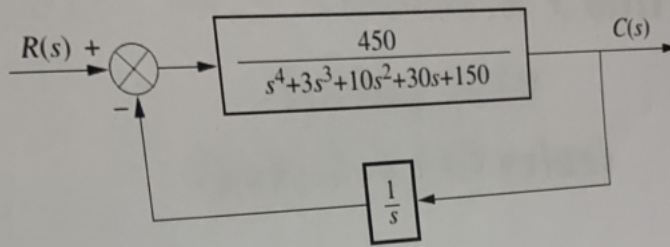


Figure 3 A closed-loop control system.

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Given data

$$\text{Equation} = \frac{450}{s^4 + 3s^3 + 10s^2 + 30s + 150}$$

$$\text{Characteristic Equation} = 1 + G(s)H(s) = 0$$

$$1 + \frac{450}{s^4 + 3s^3 + 10s^2 + 30s + 150} \times \frac{1}{s} = 0$$

$$s^5 + 3s^4 + 10s^3 + 30s^2 + 150s + 450 = 0$$

Using R.H. Criterion

$s^5$	1	10	10
$s^4$	3	30	450
$s^3$	$\frac{(30-30)}{3}$	$\frac{4500-300}{30}$	0
$s^2$	$\frac{30E+450}{E}$	450	0
$s^1$	$-\frac{(150(\frac{30E+450}{E}) - 450E)}{30E+450}$		0
$s^0$	$\frac{30E+450}{E}$		0

$$s^0 = 450$$

To check no. of sign changes as  $\epsilon \rightarrow 0^+$ 

$$\frac{30E+450}{E} \Rightarrow +ve$$

$$-\frac{150(30E+450) - 900E^2}{30E+450} \Rightarrow -ve$$

$$s^5 = +ve$$

$$s^4 = +ve$$

$$s^3 = +ve$$

$$s^2 = +ve$$

$$s^1 = -ve$$

$$s^0 = +ve$$

2 Sign changes.

Two poles equal in the R.H.S of the S-plane.

=

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Q: All steps please

A: [See answer](#)

Q: Problem 3 (25 marks): For the system of Figure 3, apply the Routh-Hurwitz Criterion to tell how many closed-loop poles are located in the right half-plane, in the left half-plane, and on the  $j\omega$ -axis. Notice that here is positive feedback.  $R(s) + C(s) = 18s^3 + 54s^2 - 752s - 185$  Figure 3

A: [See answer](#)

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A: [See answer](#) 100% (1 rating)

Q: 4. Determine whether the unity feedback system is stable if

A: [See answer](#)

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