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17/EEN604/035 EEE441

1) In control theory and stability theory, root locus technique is a graphical method for examining how the roots of a system change with variation of a certain system parameter, commonly a gain within a feedback system. This is used to stabilize criterion in the field of classical control theory developed by Walter R. Evans which can determine stability of the system.

2) a) Entire row is zero on the Routh table

If there's an entire row of zeros, this indicates the possibility of two roots i.e., the presence of pairs of poles, that are mirrored about the imaginary axis. If this occurs, it can be resolved using the Routh-Hurwitz Criterion by:

- i) Creating an auxiliary polynomial from the row, above the row of zeros, skipping every other power of s .
- ii) Differentiating the auxiliary polynomial with respect to s .
- iii) Replace the zero row with the coefficients of the resulting polynomial.
- iv) Complete the Routh table.
- v) Evaluate the sign of the first column's entries.

b) Determine the poles on the $j\omega$ axis

Forcing the row of zeros into the Routh table will yield the gain, going back one row to the even polynomial equation and solving for the roots, yields the frequency at the imaginary axis

$$0 \pm j\omega \quad \text{--- poles}$$

The eqn above determines the system's poles for the under damped system