

Root Locus Rules

Mechanical Engineering

Sketching where the closed-loop poles travel as the gain rises.

The locus is the path of the closed-loop poles as gain goes from zero upward.

Where it starts and ends

Starts at the open-loop poles, gain zero

Ends at the zeros, or off to infinity

Number of branches equals number of poles

Always symmetric about the real axis

Where it goes

On the axis left of an odd count

Asymptotes at $(2k + 1)180 \div (n - m)$ degrees

Centroid = $(\Sigma \text{ poles} - \Sigma \text{ zeros}) \div (n - m)$

Crosses the axis at the Routh gain

Adding a zero pulls the locus left and stabilises. Adding a pole pushes it right and does the opposite.