

Bode Plots

Electrical Engineering

Sketching magnitude and phase from the factored transfer function, corner by corner.

Straight-line asymptotes first; the true curve never wanders far from them.

1 Put $H(s)$ in standard form

Factor into real poles, real zeros and quadratic pairs, each normalised.

2 Start at low frequency

Plot the DC gain in dB, plus $20n$ dB per decade for n poles at the origin.

3 Mark every corner

One corner per pole and per zero, noting which way each one bends the line.

4 Accumulate the slopes

A pole adds -20 dB per decade, a zero adds $+20$. Slopes simply add up.

5 Sketch the phase

Each real pole gives -90° , spread over a decade either side of its corner.

At the corner itself the true magnitude sits 3 dB under the asymptote for a pole, and 3 dB over it for a zero.