

Poles and Response

Mechanical Engineering

A map from where a pole sits on the s plane to what you see in time.

The slowest pole dominates everything you actually observe.

Pole location	What you see in time
Far left, real	Fast decay, no oscillation
Near the axis, real	Slow decay, dominates the response
Complex pair, left half	Decaying oscillation
On the imaginary axis	Sustained oscillation
Anywhere in the right half	Growing output, unstable
At the origin	Pure integrator, output ramps

A pole five times further left than the dominant one barely changes the shape at all. Ignore it early.