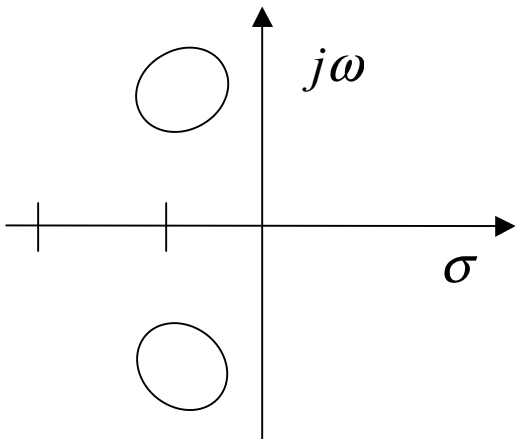


Robustness Analysis of $P(s, Q)$ (Hurwitz Stability)

Root set for a grid on Q



Start from a stable $q^* \in Q$

Stable neighborhood bounded by

$$\operatorname{Re} p(j\omega, q) = 0$$

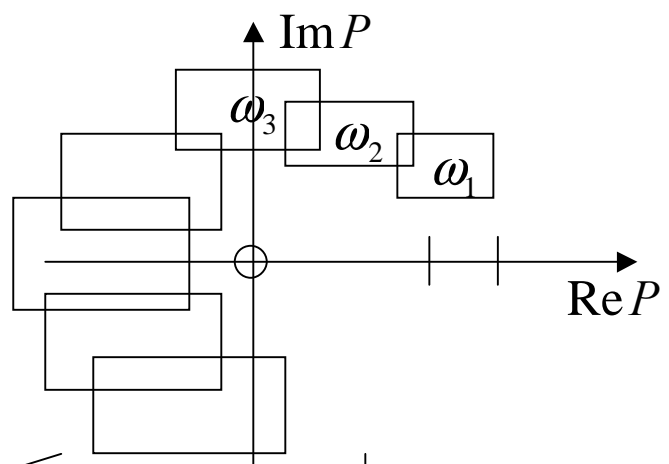
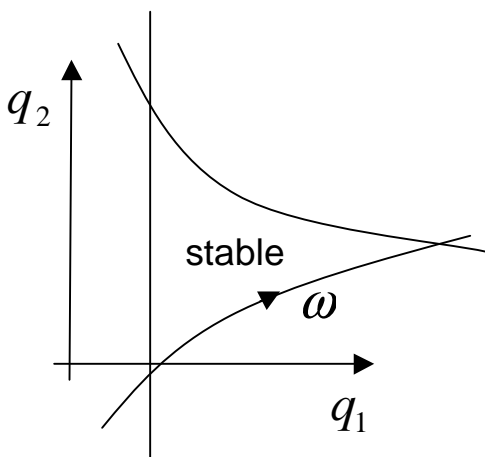
$$\operatorname{Im} p(j\omega, q) = 0 \quad (*)$$

eliminate ω , $\det H_n(q) = 0$

Grid ω , singular frequencies

solve (*) for $q_1(\omega), q_2(\omega)$

zero exclusion from the value set $P(j\omega, Q)$ for all $\omega > 0$

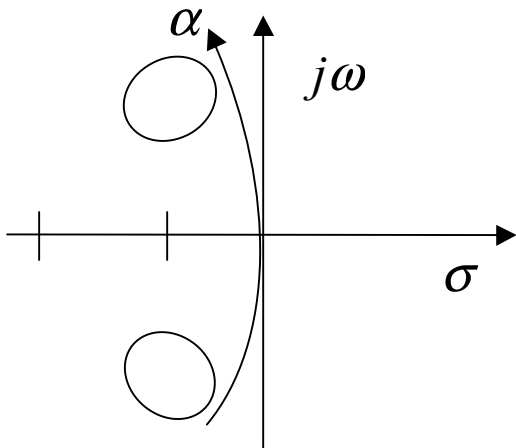


Prove Kharitonov, Edge result.
Test edges by Bialas.

Construct value sets for each grid point on ω .

Robustness Analysis of $P(s, Q)$ (Γ -stability)

Root set for a grid on Q



Start from a Γ -stable $q^* \in Q$

Γ -Stable Neighborhood bounded by

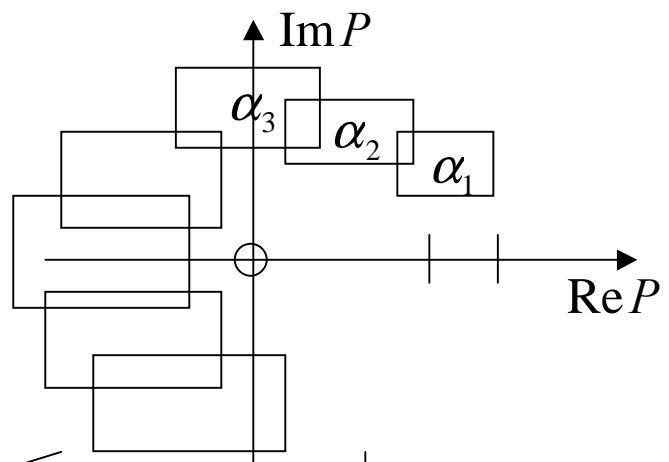
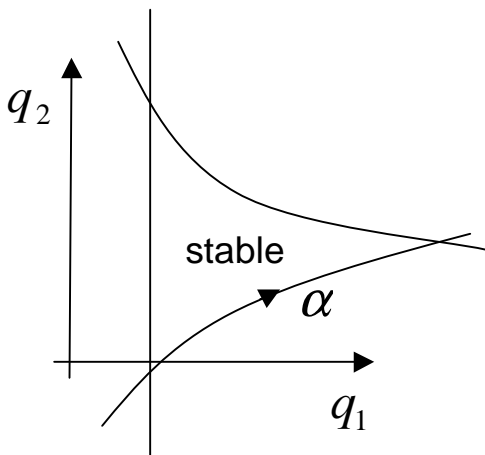
$$\begin{aligned} \operatorname{Re} p(\alpha, q) &= 0 \\ \operatorname{Im} p(\alpha, q) &= 0 \end{aligned} \quad (*)$$

eliminate α ,
complicated algebraic
conditions

Grid α , singular frequencies

solve (*) for $q_1(\alpha), q_2(\alpha)$

zero exclusion from the
value set $P(\alpha, Q)$ for $\alpha \in [\alpha^-, \alpha^+]$



Prove Edge result
Test edges by root locus

Construct value sets for each α
or: Stability profile