

A Simple Example

$$L(s) = \frac{1}{s^2 + s} \quad b(s) = 1, \quad a(s) = s^2 + s$$

Characteristic equation: $a(s) + Kb(s) = 0$

$$s^2 + s + K = 0$$

Here, we can just use the quadratic formula:

$$s = -\frac{1 \pm \sqrt{1 - 4K}}{2} = -\frac{1}{2} \pm \frac{\sqrt{1 - 4K}}{2}$$

$$\text{Root locus} = \left\{ -\frac{1}{2} \pm \frac{\sqrt{1 - 4K}}{2} : 0 \leq K < \infty \right\} \subset \mathbb{C}$$