**ME 3600 Control Systems**

**What is a Root Locus Diagram?**

**Definition:** A root locus diagram is the plot of the paths of the poles of a closed loop system as a single parameter $K$ is varied.

Root Locus Diagram: $0 \leq K < +\infty$

Complementary Root Locus Diagram: $-\infty < K \leq 0$

**Example:**

- Proportional position control of a certain space platform can be expressed by the block diagram below. The open loop platform dynamics is **second order and under-damped**.

![Block Diagram](image)

**Question:** How do the poles of the closed loop system vary as the parameter $K$ changes?

- One way to answer this question is simply to find the closed loop transfer function, identify the characteristic equation, and compute the poles for a variety of parameter values. For this system, the characteristic equation is $s^3 + 2s^2 + 4s + 0.6K = 0$. The figure below shows a plot of the poles of the system for a given set of $K$ values.