Detectability

Detectability Definition

DTLTI or CTLIT system, defined by (A, C), is detectable if there exists a matrix L such that $A - LC$ is stable.

Detectability Theorem

DTLTI or CTLIT system, defined by (A, C) is detectable if all its unobservable modes correspond to stable eigenvalues of A.

Facts:

- A is stable $\Rightarrow (A, C)$ is detectable
- (A, C) is observable $\Rightarrow (A, C)$ is detectable as well
- (A, B) is not observable $\Rightarrow$ it could still be detectable
- If system has some unobservable modes that are unstable, then no gain L can make $A - LC$ stable
- $\Rightarrow$ Observer will fail to track system state