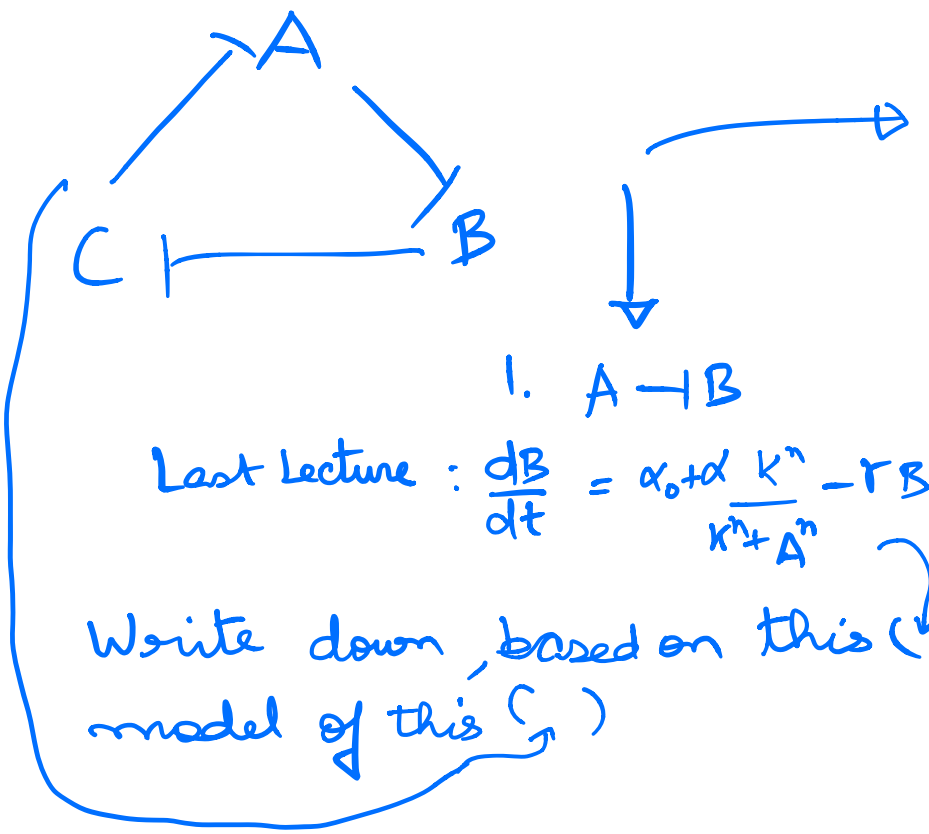
20.01.2020

EL 707

Language of limit cycles we are familiar with $\dot{r} = r(1-r^2)$, $\dot{\theta} = 1$ (why?)



1. $A \dashv B$

Last Lecture : $\frac{dB}{dt} = \alpha_0 + \alpha \frac{K^n}{K^n + A^n} - \gamma B$

Write down, based on this (↘), the mathematical model of this (↗)

$$\frac{dB}{dt} = \alpha_0 + \frac{\alpha K^n}{K^n + A^n} - \gamma B \quad \text{"}A \dashv B\text{"}$$

$$\frac{dC}{dt} = \alpha_0 + \frac{\alpha K^n}{K^n + B^n} - \gamma C \quad \text{"}B \dashv C\text{"}$$

$$\frac{dA}{dt} = \alpha_0 + \frac{\alpha K^n}{K^n + C^n} - \gamma A \quad \text{"}C \dashv A\text{"}$$

This is a model of the ring oscillator repressilator.

How to see if this has a limit

cycle oscillation?

→ numerically simulate for some parameter values and initial condition

→ linearize (about what?)

→ convert into one variable (then use advanced knowledge?)

→ find the equilibrium point

Quiz 2

Write down the mathematical model for the oscillator in the paper titled "Engineering compensation.." and justify each term.