Time Response - Lecture 4

ME3050 - Dynamics Modeling and Controls

April 15, 2020

Common Questions this Week

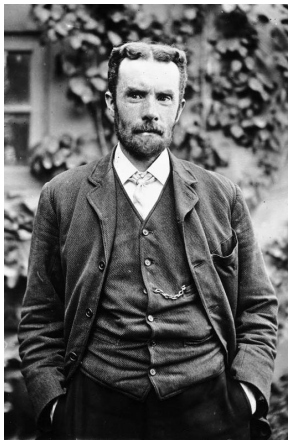
Lecture 4 - Common Questions this Week

- The Step Input
- Obtaining the Response Equations in Problem 1
- Using the Error function and the Time Constant
- Stability and the Roots

The Step Input

The **step function** is a mathematical concept that represents an instant change.

Heavyside's Step Function



$$u_s(t) = \begin{cases} 0 & t < 0 \\ 1 & t \geq 0 \end{cases}$$

$$f_{step}(t) = Fu_s(t) = \begin{cases} 0 & t < 0 \\ F & t \geq 0 \end{cases}$$

Obtaining the Response Equations in Problem 1

You can see that each of the models in problem 1 is linear and first order. You do not have to re-derive (even though you easily could) the model but please reference where you found the equations you used.

Using the Error function and the Time Constant1

References

- System Dynamics, Palm III, Third Edition - Section 8.3 - Step Response of Second Order Systems