EENG307: Time Response of First Order Systems[1]

Lecture 10

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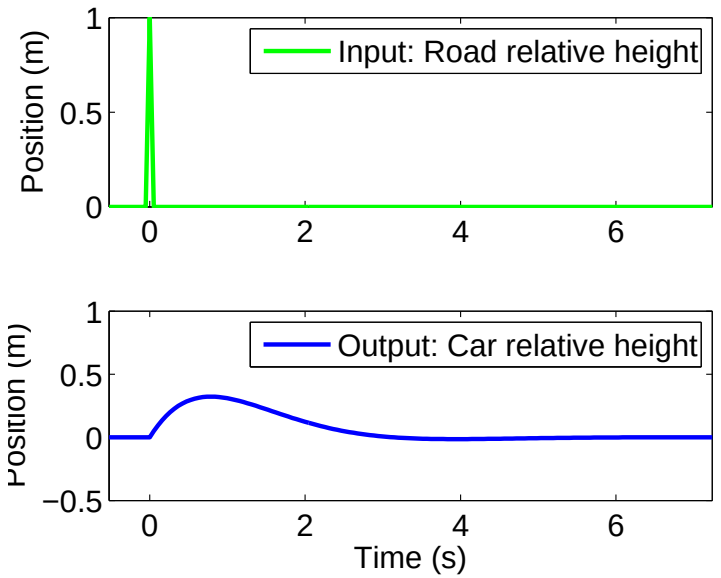
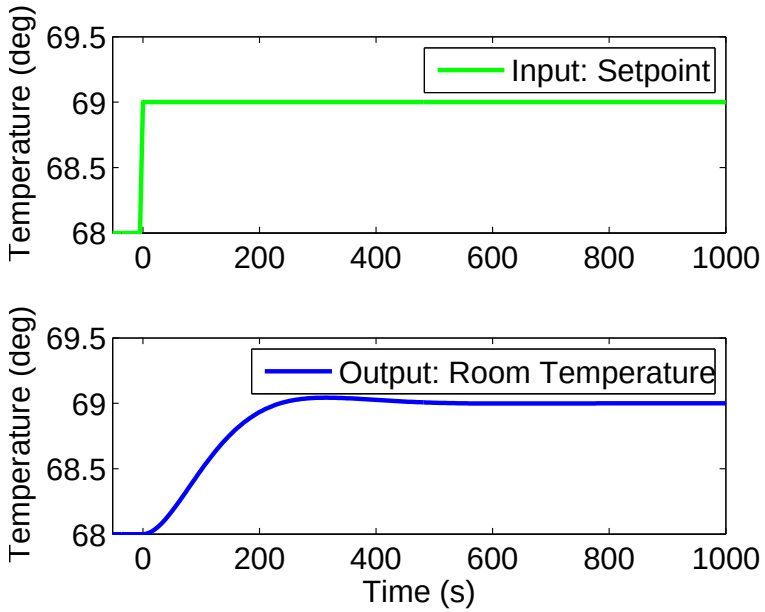
Suspension Impulse Response

source:
http://upload.wikimedia.org/wikipedia/commons/5/5b/Porsche_911SC_Slantnose_1982_2.jpg

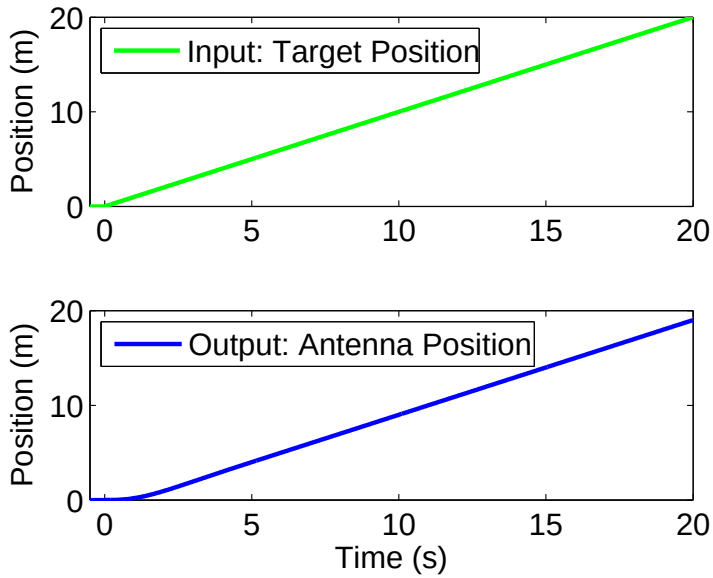


Temperature Regulator Response

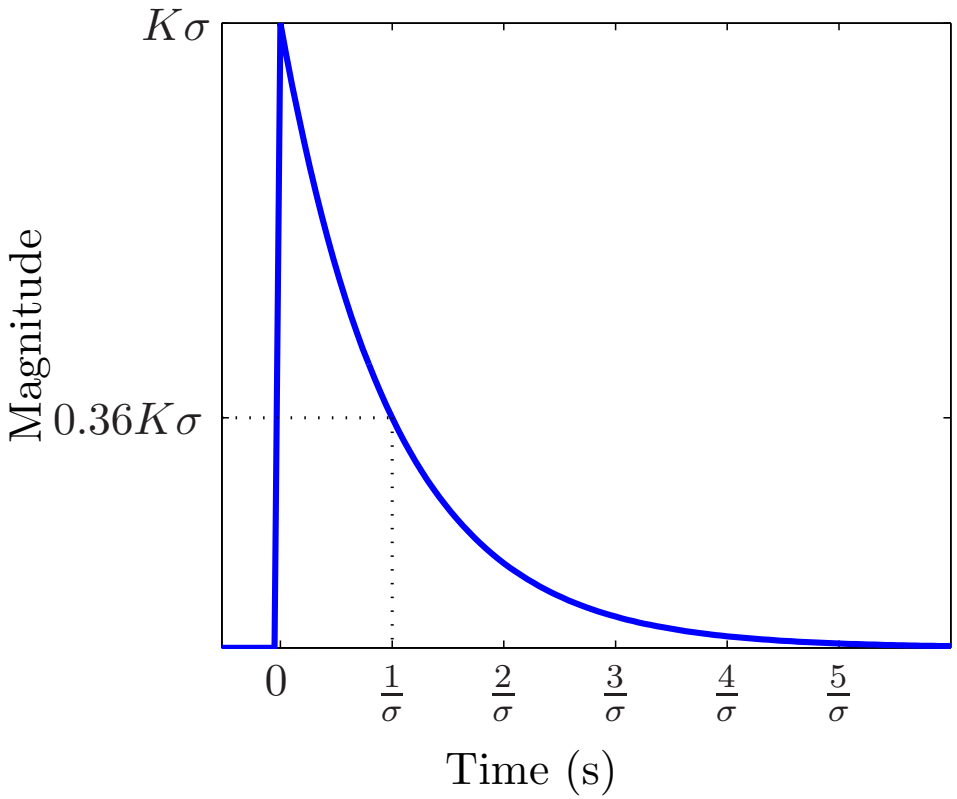


Tracking Response

Source:
http://commons.wikimedia.org/wiki/File:
C-band_Radar-dish_Antenna.jpg



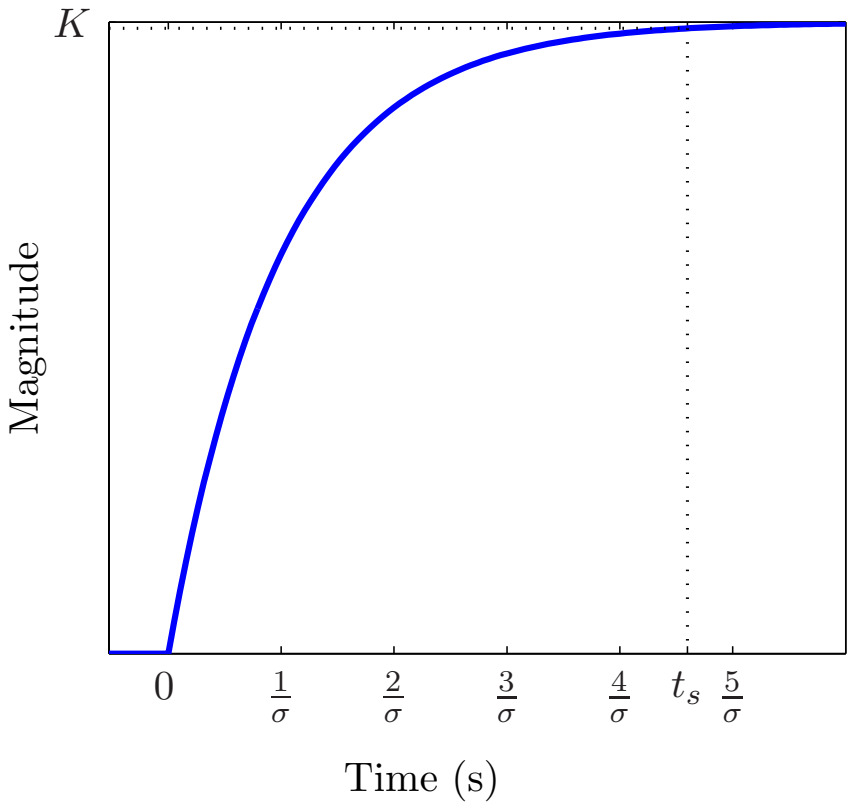
Impulse Response Plot



Definition

The *time constant* of a first order system is $\tau = \frac{1}{\sigma}$, and is the time for the impulse response - the magnitude of the output signal in response to an impulse input - to decay by 64%.

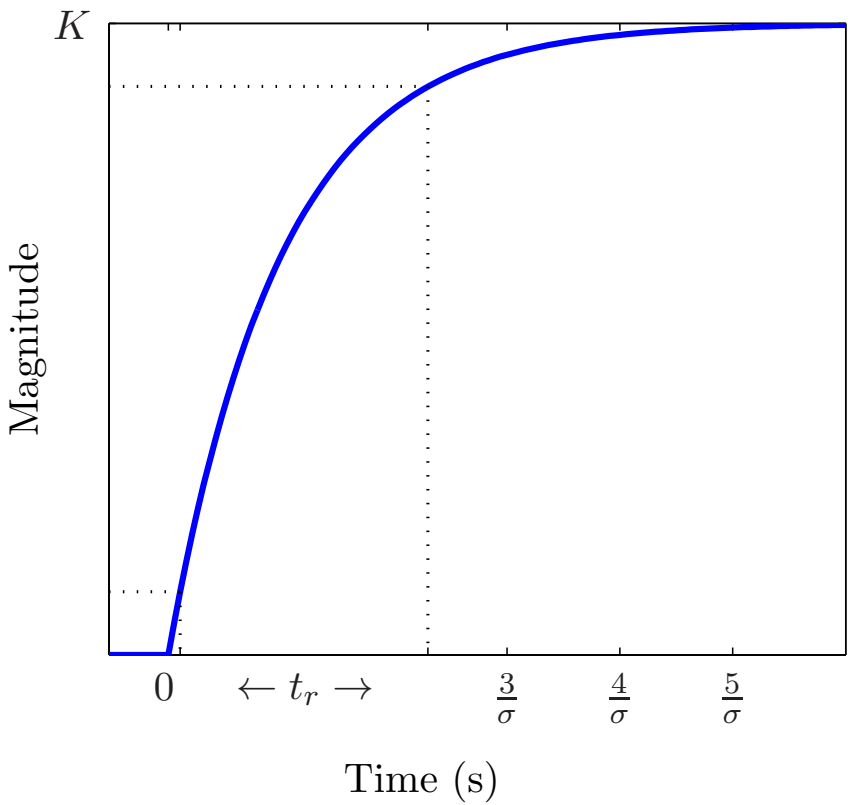
Step Response Settling Time



Definition

The step response *settling time* is the time for the step response - the magnitude of the output signal in response to a step input - to go reach within 1% of the final value, and for a first order system $t_s = \frac{4.6}{\sigma}$

Step Response Rise Time



Definition

The step response *rise time* is the time for the step response to go from 10% to 90% of its final value, and for a first order system $t_r = \frac{2.2}{\sigma}$