

Modelling and control summaries



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MATLAB GUIs – 1st order responses

ASSUMPTION: Students should understand the context of 1st order responses.

Assume a standard **time constant form** for a 1st order model with constant coefficients, output $y(t)$ and constant input $u(t)$.

$$T \frac{dy}{dt} + y = Ku \Rightarrow y = Ku(1 - e^{-\frac{t}{T}})$$

The aim is to use MATLAB tools to investigate how the response $y(t)$ depends upon the choices of time constant T and steady-state gain K . Assume $u(t)=1$ for convenience.

MATLAB GUI is called **firstorderresponses.p**

This is available using the link on the website

Just type: `>>firstorderresponses` to run. You can change the parameters and investigate behaviour changes as you do so.

KEY POINT – change T,K on the GUI to see this in action.

$t=T \rightarrow y(t)=0.63K$ for any T and K
 $t=2T \rightarrow y(t)=0.86K$ for any T and K etc.

