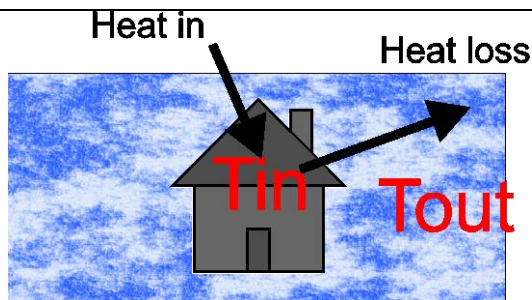


Modelling and control summaries

by Anthony Rossiter

MATLAB GUIs – house temperature

ASSUMPTION: This doubles as an example of a simple heat exchanger.



GUI assumes that $T_{out}=10$ for convenience.

- Heat loss is proportional (through k) to the temperature difference between inside and outside.
- Heat stored depends on the capacitance C of the house.
- Heat supplied W_{in} is given in watts (source not specified):

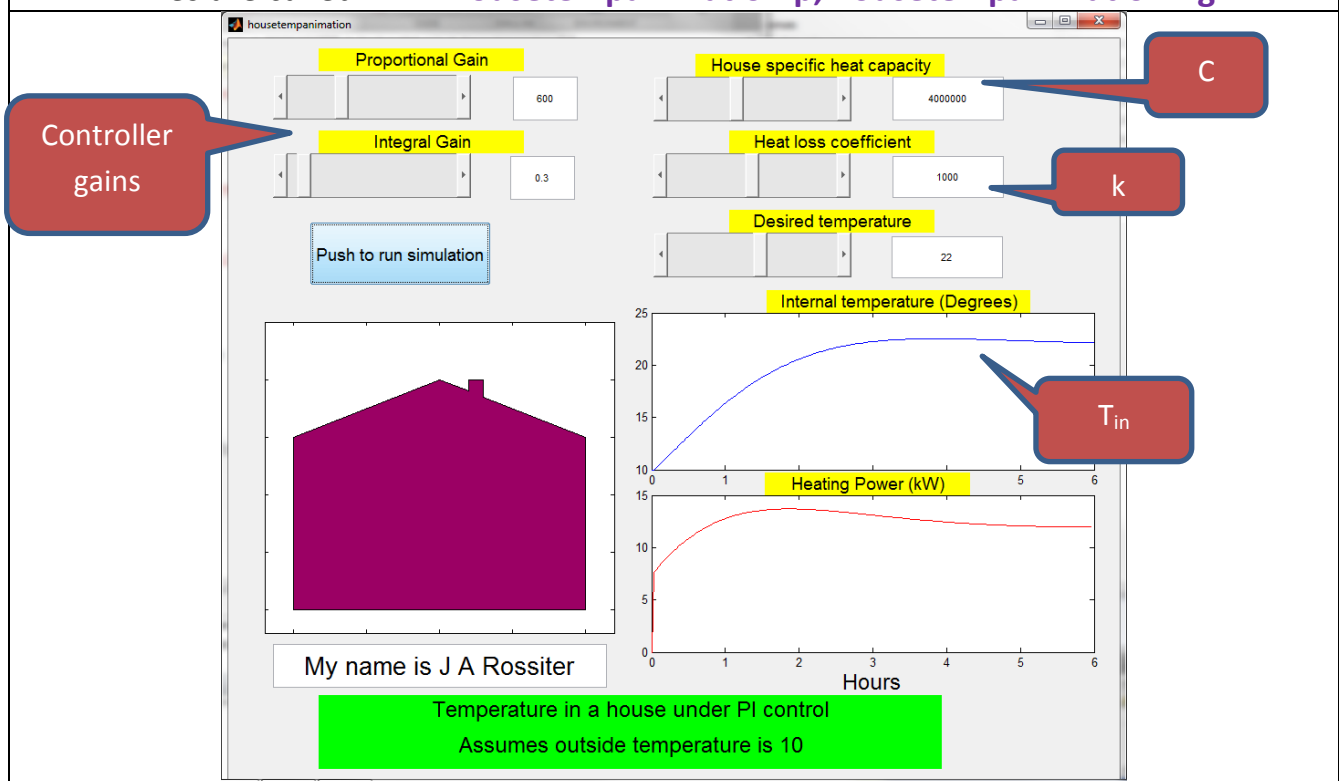
$$C \frac{dT_{in}}{dt} = W_{in} - k(T_{in} - T_{out})$$

The GUI allows the user to select C and K and also to define the desired internal temperature.

GUI 1 allows the users to investigate:

1. the impact of changing PI control parameters for maintaining the internal temperature.
2. the impact of changes in heat capacitance.
3. the impact of changes in heat loss coefficient.
4. the impact of changes in target temperature.

Files are called **housetempanimation.p, housetempanimation.fig**



REMARK: The PI controller works on the difference between the internal temperature and the desired temperature T_d and hence:

$$W_{in} = K_p (T_d - T) + K_i \int_0^t (T_d - T) dt$$

GUI 2 allows the users to compare PI control with on-off control based on a dead-band:

It uses $C=15 \times 10^6$; $k=5000$; max power = 100kW

Files are called **housetempanimationonoff.p**, **housetempanimationonoff.fig**

