Exercise: RGA and decoupling

A distillation column can be seen as a TITO system

Input: $[q_R, Q_1]$ where q_R is the flow and Q_1 is the power for the kettle.

Output: $[T_{T,}\ T_B]$ T_T is the temperature in the top of the column, T_B is the temperature in the bottom of the column.

A linearized model of the distillation column given as:

$$\begin{bmatrix} T_T(s) \\ T_B(s) \end{bmatrix} = \begin{bmatrix} h_{11}(s) & h_{21}(s) \\ h_{21}(s) & h_{22}(s) \end{bmatrix} \begin{bmatrix} q_R(s) \\ Q_1(s) \end{bmatrix}$$

$$h_{11}(s) = \frac{-10}{1 + 100s}$$

$$h_{12}(s) = \frac{3}{(1 + 100s)(1 + 8s)}$$

$$h_{21}(s) = \frac{-11}{1 + 200s}$$

$$h_{22}(s) = \frac{10}{1 + 100s}$$

Find the best pairing by use of RGA analyzes

Design controllers for the two SISO systems

Design a controller using decoupling