

Exercises for Chapter 11

1. Consider the Wood-Berry binary distillation column model presented on page 359 in the book.
 - a. Control the system using two PID controllers, without any decoupling. Try to obtain good control of both outputs. As usual, check performance, robustness, and measurement noise amplification.
 - b. Suppose that efficient control of y_1 is of primary concern, and that the performance of the second loop can be relaxed. Retune the controllers for these new requirements.
 - c. Now suppose that the goal is to obtain efficient control of both outputs again. Use the static decoupler given on page 359, and retune the controllers.
 - d. Finally, use the dynamic decoupler presented in the licentiate thesis by Pontus Nordfeldt, on page 66. You can use the PID controller parameters given in the thesis.
2. Ola and Olof are creating a new lab process for projects in the Process control course. It can be described as follows:

The process consists of a tank where we control the inlet flow (u_1) and measure the level (y_1). There is also a heater that is controlled (u_2) and the water temperature is measured (y_2). The outflow from the tank is determined by a pump that is not controlled, i.e. it can be seen as a disturbance.

Describe the structure of this TITO system and discuss control strategies.