 USN/TNM/EIK

Report for assignment: Programming a simulator of a heated tank in Python

Course: FM1220-1 Automatic Control

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# Calculation of the static operating point

Calculate from the model the constant power, P0, needed to bring the temperature to a constant value of 25 deg C.

## Solution

# Programming and simulation

Program a simulator of the tank heater in Python. The simulator must be implemented with "native" code in a For loop based on the Euler Forward discretization of the model (a built-in simulation function of Python should not be used). You can set the time-step to 1 s. The following variables should be plotted: T, Tin, and Tenv in one subplot, and P in another subplot.  
Assume that the initial temperature is T\_init = 20 deg C. Run a simulation with P = P0 as calculated above. Is the static T the same as specified in task 1 above?

## Solution

# Stability of the simulator

Demonstrate that the simulator becomes numerically inaccurate, and possibly unstable, if you select a (too) large simulator time step.

## Solution

# Time delay

Set the time step to 1 sec. Include a time delay of 60 sec in P. Verify with a simulation that the time delay has been implemented correctly.

## Solution