Combining Two-Degree of Freedom Control Structures with Optimization-based or Adaptive Elements

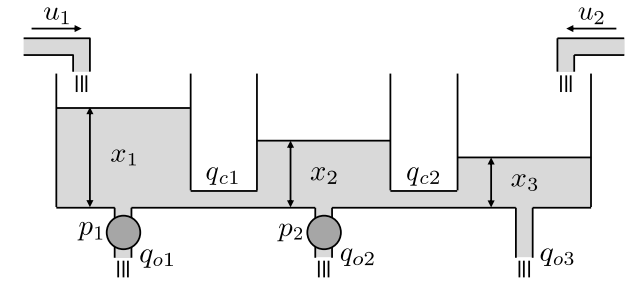
TECHNISCHE UNIVERSITÄT DARMSTADT

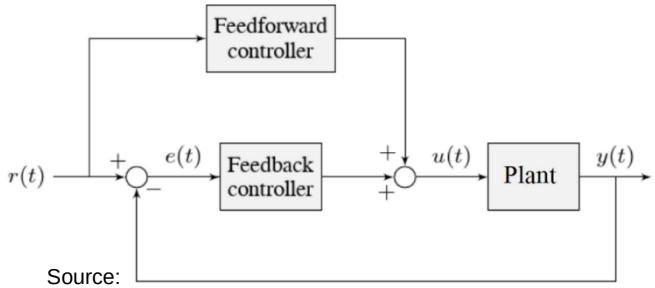
Proseminar (1 Person, Homeoffice)

Many processes, such as the height control of a three-tank system, require tracking a time-varying reference signal as closely as possible during operation. Depending on the explicit process in question, many different control structures could be applied for control. One possibility are two-degree of freedom controllers, which can assign the tasks of reference tracking and disturbance rejection individually to two different components. Historically, these controller types have been used extensively for a variety of PID controllers for linear systems but recent research also applies the control structure for nonlinear systems, such as 2DOF optimal control [1].

Within the scope of this Proseminar, you will investigate the idea of combining a two-degree of freedom control structure with elements of optimization-based or adaptive approaches. Hereby, you will first conduct a general literature review concerning possible control structures for reference tracking problems, including optimization-based and adaptive approaches. You will then focus on two-degree of freedom control structures and possible combinations with elements of optimization-based or adaptive approaches.

In order to learn scientific working, a written report (approx. 10 pages) is to be handed in and a short scientific presentation (approx. 10 minutes) is to be given. If you have any questions, feel free to contact me.





Source: https://docs.wpilib.org/en/stable/docs/software/advanced-controls/introduction/tuning-flywheel.html

[1] Shaffer, R. (2019). Two Degree of Freedom Optimal Control for Nonlinear Systems with Parameter Uncertainty. University of California, Santa Cruz.

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