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Course : Process Control

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PC - Project (2017 SS)

Control of a Single Process Unit

The aim of the project is to control a multivariable process unit by following the formal steps for control system design: process modeling, analysis, controller design and implementation.

Remark : Project work should be carried out by groups of students.

Tasks

1. **Process description, problem definition and modelling**

   - Propose a single process unit to control. Draw the process flow diagram. (The process should be multivariable and nonlinear.)

   - Do a literaure survey on this process and its control .

   - Determine the control design aspects of the process .

   - Obtain a mathematical model of this process and do the degrees of freedom analysis.
     - Submit a small report by summarizing the points above.

2. **Simulation and analysis of the nonlinear process model**

   - Numerical solution of mathematical model equations in Matlab.

   - Plot the result of open loop dynamic simulations.
     - Submit the nonlinear model simulation results .

3. **Control structure selection/General pairing problem**

   - Linearization of the model equations.

   - Having a linearized system equations, select the best control structure by computing and comparing available criteria (e.g. RGA) for proposed alternative control structures .
     - Submit the results of control structure selection.

4. **Controller design, implementation and comparison**

   - Design suitable controllers for the best control structure by using different controller tuning methods.

   - Test the performance of controllers on the nonlinear process.

   - Compare the performance of controllers designed by different methods.

   - Summarize your final results.

5. **Submit a complete report (10-20 page) including the results of the tasks above (1,2,3 and 4) .**