Base layer control of the Tennessee Eastman Process

A well-known industrial benchmark for plant-wide monitoring, control, optimization, maintenance and fault diagnosis is the Tennessee Eastman process.

The Tennessee Eastman process has been proposed by Downs and Vogels in 1993 [2] and upgraded in 2015 by Ricker et al. [3]. The overall process is implemented in Simulink. In the reactor an exothermic process produces two products and one byproduct. Several realistic disturbances are defined. The plant is operated at different operating conditions, consisting of three different product mixtures operated at maximum throughput and at 50% of the nominal throughput. These six operating conditions cover a large nonlinear range of the process.

As a result the design of a base layer control structure and tuning for both tight control of the process in the six operating conditions and change-over from one arbitrary operating to another turns out to be a nontrivial challenging plant-wide control problem.

In the project the student has to study plant-wide control concepts. Several base layer and more advanced strategies that have been proposed for the Tennessee Eastman process in the literature will form the starting point for the project.

The aim of the project is to come up with a base-layer control strategy that enables operators to control the plant and form the basis for implementation of more advanced operating strategies (MPC, Distributed Control, Real time Optimization, fault detection and diagnosis) and controller performance monitoring tools as developed in the autoProfit project [4].

**Type of Work:** 50% control theory, 50% application
Prerequisites: Enthusiasm, interest in process control and experience with Simulink/Matlab

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References:


