

TRANSACTIONS OF THE FALL 2003 MEETING OF THE TEXAS TECH PROCESS CONTROL AND OPTIMIZATION CONSORTIUM

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HIGHLIGHTS

- The presentations will be made available to the consortium members at the website, <http://www.che.ttu.edu/pcoc/>. Please contact Professor Hoo as (806) 742-4079 for login and password if assistance is needed.
- **Workshop & Panel Discussion:** The speakers and panel participants were David Hokanson (ExxonMobil), Walter Wrobel (Lyondell), Don Morrison (Honeywell), Jack Watts (ConocoPhillips), and Charles Cutler (CutlerJohnston). Each provided their viewpoints on MPC controller maintenance. Their presentations are available at the website.
- **The first presentation,** “Batch Reactor Control” was given by Dr. Carlos Ruiz of Soetica (Buenos Aires, Argentina). Carlos described an application whose original control strategy had competition between the cooling and heating loops thereby affecting product quality. Soetica engineers went about designing a control strategy that began with step testing, modeling and identification. Next, controller design and finally closed-loop testing to validate the improvements. The results of this study include:
 - Consistent operating conditions and more uniform product quality
 - The desired setpoint can be maintained safely
 - Reduction in total batch duration
 - Decrease in maintenance costs
 - Easy tuning (a single tuning knob per controller)
 - Parameters adjustment to other recipes can be made in a straightforward manner
- **The second presentation,** “Application of UPID™ to a Catalytic Cracker” by Brendan Minter of Applied manufacturing Technologies (Houston, TX). UPID™ is a universal identification tool marketed by CutlerJohnston. Major features of UPID™ include:
 - Finite Impulse Response (FIR) modelling of multivariable process data
 - Ability to incorporate base level PID configuration and tuning
 - Ability to adjust base level controller tuning and configurations

Brendan went on to describe the revamping of the Gelsenkirchen Horst FCCU and concluded that UPID™ is a remarkably useful tool for advanced control engineers, it is not limited to specific proprietary control technology, it can bring about performance benefits in terms of project productivity and maintaining existing applications.

- **Student Posters:**

- [E. M. Vasbinder](#): A systematic approach to the integration of process design and control structure synthesis
- [V. S. Shabde](#): Model Reduction: A new non-linear Galerkin Approach
- [Z. I. Stefanov](#): Stereo-imaging methods applied to fluid flow in a collapsible tube
- [N. S. Wijeratne](#): Modeling of fluid flow in collapsible tubes with one-way membrane restrictions
- [C. D. Buescher](#): Experimental studies of collapsible tubes with membrane restrictions
- R. D. Kawathekar: Control and Modeling of a Reactive Distillation Process

Binary Distillation Simulator

- D. D. Slaback: Refinery-Wide Optimization

All student posters can also be found on the pcoc webpage. Individual information about each student can be found from their webpages.

- Karlene Hoo presented an overview of her research program. For publication references see <http://www.che.ttu.edu/pcoc/pubs/publications.htm>

Major programs include: (1) Modeling and control of distributed processes using a new system identification method that involves a nonlinear Galerkin method. (2) Transition control using multiple adaptive state-shared model design in a model predictive control framework. (3) The integration of conceptual process design with operability and controllability considerations using a particular modular decomposition of the steady state flowsheet and a decision making tool – modified Analytical Hierarchy Process (AHP) to rank order the importance among competing issues. (4) The fundamental modeling and control of black liquor falling film evaporator plant. (5). Experimental and modeling program to understand non-Newtonian fluid flow in collapsible tubes with one-way membrane restrictions (<http://www.che.ttu.edu/faculty/hoo2/bioResearch.htm>).

- Jim Riggs presented an overview of his research program.

Major programs include: (1) Nonlinear Model Predictive Control of a reactive distillation column. (2) Determination of the time to runaway of an exothermic CSTR. (3) Modeling, control, and optimization of fixed bed reactors. (4) Refinery-wide optimization

- Jim Riggs presented a visual basic simulator that runs under MS Excel that models two binary distillation columns: a C₃ splitter and a methanol/water column. The simulator provides a “point and click” user interface and allows for open and closed loop PID test for both columns with noise and filtering for product composition and level measurements. The simulator allows the user to select from 10 different control configurations and use default controller settings or apply new controller settings. The simulator is ideal for training new

control engineers on controller tuning and configuration selection for columns.

- There were representatives from the six of seven sponsors and eight visiting companies in attendance at the meeting. The visitors included Lyondell, Honeywell, Alstom, CutlerJohnston Corp., Soteica, Applied Manufacturing Technologies, and ExxonMobil.
- The next workshop will be on “Controller Benefits Calculation and Justification.”

ATTENDANCE

Member Representatives

John Wassick
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Daniel Lee
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