Integrated Control and Optimization for the Process Industry

Results of a research project funded by the European Commission

Martin Friedrich

Bayer Technology Services

INCOOP Workshop
Düsseldorf, January 23 -24, 2003
Overview

• Welcome
• Workshop goal
• Goal of research project
• Partners and their roles in the project
• Agenda
• Organisational
Goals for the Workshop

• To present results obtained during the joint research project „Integrated Process Control and Plantwide Optimisation“ funded by the European Commission

• To initiate discussion about current state of the art and future needs

• To encourage future collaboration
Goals of joint project

Integrated process control and plantwide optimisation:

• improve existing control and optimisation technology for process industry
• develop methods and tools for industrial applications of
  – dynamic real time optimisation
  – nonlinear model predictive control
• test developed tools on industrial examples
• evaluate cost-benefit-ratio
Project Partners

- RWTH Aachen: W. Marquardt, M. Schlegel, J. Kadam
  - dynamic real time optimisation
  - hybrid modelling, model reduction, state estimation, software environment
  - NMPC, software environment
- IPCOS: T. Backx, J. Ludlage
  - project management, software architecture / implementation
- MDC Technology: C. Hawkins
  - D-RTO tools
- Shell Chemicals: P. J. Brouwer, S. de Wolf, C. Colantonio
  - example process I
- Bayer AG: H. de Meyer, M. Friedrich, G. Dünnebier, K.-U. Klatt
  - project coordination, example process II
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker</th>
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<tbody>
<tr>
<td>11:00</td>
<td>Welcome and introduction</td>
<td>Martin Friedrich, Bayer AG</td>
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<tr>
<td>11:15</td>
<td>General scope, goals and overview of INCOOP</td>
<td>Ton Backx, IPCOS Technology</td>
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<td>12:15</td>
<td>Lunch</td>
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<tr>
<td>14:30</td>
<td>Real time dynamic optimization</td>
<td>Wolfgang Marquardt, RWTH Aachen</td>
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<td>15:15</td>
<td>Coffee break</td>
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<tr>
<td>15:30</td>
<td>State estimation and long horizon MPC for nonlinear industrial applications</td>
<td>Siep Weiland, TU Eindhoven</td>
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<td>16:15</td>
<td>Hybrid modeling and model reduction</td>
<td>Johan Grievink, TU Delft</td>
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<td>17:00</td>
<td>Coffee break</td>
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<td>17:15</td>
<td>Industrial challenges and requirements for optimization and control of the Shell case study</td>
<td>Piet-Jan Brouwer, Shell Chemicals</td>
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<tr>
<td>17:45</td>
<td>Industrial challenges and requirements for optimization and control of polymerisation processes</td>
<td>Guido Dünnebier, Bayer AG</td>
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<td>19:45</td>
<td>Dinner</td>
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Workshop Introduction

Agenda Jan. 24, 2003

08:30 Invited lecture: Plant-wide online dynamic modelling with state estimation
            Philippe Hayot, Dow Chemicals
09:30 INCOOP software architecture
            Mario Balenovic, TU Eindhoven
10:00 Start of software demonstration
            Mario Balenovic, TU Eindhoven
10:15 Coffee break
10:30 INCOOP methodology applied to Shell case
            Adrie Huesman, TU Delft
            Peter Verheijen, TU Delft
11:00 INCOOP methodology applied to Bayer case
            Jitendra V. Kadam, RWTH Aachen
11:30 Review of software demonstration
            Mario Balenovic, TU Eindhoven
12:00 Final discussion, vendors' and end users' viewpoint, audience feedback
            Ton Backx, IPCOS Technology
            Chris Hawkins, MDC Technology
12:45 Closing of the workshop
            Ton Backx, IPCOS Technology
• bus transfer from venue to hotel: departure 18.45 h
• dinner in Schumacher’s Restaurant: 19.45 h (just a few steps from the hotel, meet at 19.30 h in lobby)
• bus transfer from hotel to venue (tomorrow): departure 7.45 h
• in case of problems: contact information desk