21st Nordic Process Control Workshop in Åbo, Finland, 18–19 January 2018

Preliminary Program (12.12.2017)

Thursday 18 January

08.15–08.50 Registration

08.50–09.00 Welcome to the 21st NPCW

09.00–09.15 Nordic Process Control Award presented to Prof. Dale Seborg

09.15–10.00 Award Lecture by Prof. Dale Seborg
A Process Control Odyssey

10.00–10.20 Coffee break

10.20–12.00 Session 1: Optimization and Control

On Handling Non-Linearity for Model-Based Predictive Control and Optimization
Hans Aalto and Antti Pelkola
Neste Jacobs Oy, Finland

Industrial Implementation of Nonlinear Model Predictive Controllers
Jørgen K.H. Knudsen¹ and John Bagterp Jørgensen²
¹ 2-control Aps, Denmark, ² Technical University of Denmark (DTU)

A Novel Approach to Steady-State Gradient Estimation Using Transient Measurements
Dinesh Krishnamoorthy, Esmaeil Jahanshahi, and Sigurd Skogestad
Norwegian University of Science and Technology (NTNU)

Steady-State Optimization Using Phase-Lag Information
Olle Trollberg and Elling W. Jacobsen
Royal Institute of Technology (KTH), Sweden

State of the Art of Integration of Scheduling and Control — Remaining Challenges
Iiro Harjunkoski
Aalto University, Finland, and ABB AG, Germany

12.10–13.10 Lunch

13.20–15.00 Session 2: Performance and Diagnostics

Intelligent Vessels
Fredrik Östman
Wärtsilä Finland Oy

Analysis of Indirect Fire System Effectiveness Using Simulation and Data Farming
Miika Haataja¹, Esa Lappi², and Bernt Åkesson¹
¹ Finnish Defence Research Agency; ² National Defence University, Finland

Assessment of the Control Performance of Combustion-Thermal Power Plants
István Selek¹ and Jenő Kovács²
¹ University of Oulu, Finland; ² Sumitomo Foster Wheeler Energia Oy, Finland
Detection and Characterization of Oscillations in Control Loops using Multivariate Empirical Mode Decomposition: An Overview
Muhammad Faisal Aftab and Morten Hovd
Norwegian University of Science and Engineering (NTNU)

Using Multilevel Flow Modeling for Fault Diagnosis of Produced Water Treatment
Emil Krabbe Nielsen, Jerome Frutiger, Gürkan Sin, Ole Ravn, and Morten Lind
Technical University of Denmark (DTU)

15.00–15.20 Coffee break

15.20–17.00 Session 3: Use of Soft Sensors in Process Control

Fault-Tolerant Control of Actuators
Mats Friman
Metso Flow Control, Finland

Review and Preliminary Analysis of Virtual Flow Metering Systems
Timur Bikmukhametov and Johannes Jäschke
Norwegian University of Science and Technology (NTNU)

Model-Based Process Development and Monitoring of Lactic Acid Bacteria Fermentations
Robert Spann\textsuperscript{1}, Anna Eliasson Lantz\textsuperscript{1}, Christophe Roca\textsuperscript{2}, Krist V. Gernaey\textsuperscript{1}, and Gürkan Sin\textsuperscript{1}
\textsuperscript{1} Technical University of Denmark (DTU); \textsuperscript{2}Chr. Hansen, Denmark

Comparative Study of Kalman Filter-Based Observers with Simplified Tuning Procedures
Christoph Josef Backi and Sigurd Skogestad
Norwegian University of Science and Technology (NTNU)

State and Parameter Estimation for a Gas-Liquid Cylindrical Cyclone
Torstein Thode Kristoffersen and Christian Holden
Norwegian University of Science and Technology (NTNU)

17.00–18.00 Poster Session with Refreshments
See list of posters on last two pages

17.30–18.30 NPC Working Group Meeting

19.00–20.00 Guided tour at Aboa Vetus Museum of history

20.00– Workshop Dinner at the museum restaurant

Friday 19 January

8.20–10.00 Session 4: Control Structures and Strategies

A New Efficient Ratio Control Structure
Tore Hägglund
Lund University, Sweden

Discrete PI Controller Design for Linear Measurement Combinations in Self-Optimizing Control
Jonatan Klemets and Morten Hovd
Norwegian University of Science and Technology (NTNU)

Risk-Based Health-Aware Control of Subsea System
Adriaen Verheyleneghen and Johannes Jäschke
Norwegian University of Science and Technology (NTNU)
Resolving Issues of Scaling for Gramian Based Input-Output Pairing Methods
Fredrik Bengtsson¹, Torsten Wik¹, and Elin Svensson²
¹ Chalmers University of Technology, Sweden; ² CIT Industriell Energi AB, Sweden

On the Modified Hankel Interaction Index Array for Control Configuration Selection
Bijan Moaveni¹ and Wolfgang Birk²
¹ Iran University of Science and Engineering; ² Luleå University of Technology, Sweden

10.00–10.20 Coffee Break

10.20–12.00 Session 5: Modelling

Surrogate Model Generation Using Concepts of Self-Optimizing Control
Julian Straus and Sigurd Skogestad
Norwegian University of Science and Technology (NTNU)

Scale-Up Modeling of a Pharmaceutical Crystallization Process via Compartmentalization Approach
Merve Öner¹, Getachew S. Molla¹, Michael F. Freitag², Stuart M. Stocks², Jens Abildskov¹, and Gürkan Sin²
¹ Technical University of Denmark (DTU); ² LEO Pharma A/S, Denmark

Nonsmooth Modelling Methods in Chemical Engineering
Marius Reed, Marlene Lund, and Johannes Jäschke
Norwegian University of Science and Technology (NTNU)

Neural Network-Based Model Reduction and Sensitivity Analysis of Apoptosis
C. Alia Joko, Frank Petterson, and Henrik Saxén
Åbo Akademi University, Finland

A Dynamic Model of the Response of Foodborne Pathogenic Bacteria to High Pressure Processing
Bahareh Nikparvar¹, Nils Nieuwenkamp², and Nadav Bar¹
¹ Norwegian University of Science and Technology (NTNU); ² University of Amsterdam, the Netherlands

12.10–13.10 Lunch

13.20–14.40 Session 6: System Identification

Input PRBS Design for Identification of Multivariable Systems
Winston Garcia-Gabin and Michael Lundh
ABB AB, Sweden

Experiment Design to Obtain Uncorrelated Outputs in MIMO System Identification
Kurt-Erik Häggblom
Åbo Akademi University, Finland

Data-Based Testing for Nonlinearity in Dynamical Systems
Matias Waller
Åland University of Applied Sciences, Finland

Identification of Low Order Output-Error Models
Mikael Manngård, Jari M. Böling, and Hannu T. Toivonen
Åbo Akademi University, Finland

14.40–15.00 Closing Ceremony and Welcome to 22nd NPCW
List of Posters

Comparison of Two Classes of Observers in a Biochemical Process  
R.F. Caroço¹, J. Abildskov¹, T. López-Arenas², and J.K. Huusom¹  
¹ Technical University of Denmark (DTU); ² Universidad Autónoma Metropolitana-Cuajimalapa, Mexico

Control Strategy Based on Radial Basis Function for an Ibuprofen Batch Crystallization Process under Upstream Uncertainty  
Frederico Montes, Krist V. Gernaey, and Gürkan Sin  
Technical University of Denmark (DTU)

Modelling of the Prehydrolysis Kraft Process for Process Control  
Antton Lahnalammi, Herbert Sixta, and Sirkka-Liisa Jämsä-Jounela  
Aalto University, Finland

A Receding Horizon Optimal Control Approach for Solution Purification Process  
Bei Sun¹, Sirkka-Liisa Jämsä-Jounela¹, and Chunhua Yang²  
¹ Aalto University, Finland; ² Central South University, Changsha, China

Spectroscopic Method for Bacterial Quantification in Suspension  
Minh Nguyen¹, Jarmo Alander², and Kai Zenger¹  
¹ Aalto University, Finland; ² Vaasa University, Finland

Estimation of the Regulating Power Potential of the Grocery Store S-Market Tuira  
István Selek and Enso Ikonen  
University of Oulu, Finland

Methods and Software for Solving Convex Mixed Integer Nonlinear Programming Problems  
Jan Kronqvist  
Åbo Akademi University, Finland

Profile Based Analysis for Automatic Feature Extraction from Time Series Data  
John-Eric Saxén, Jerker Björkqvist, and Hannu Toivonen  
Åbo Akademi University, Finland

A Control Oriented Model for Inline Deoiling Hydrocyclone  
Tamal Das and Johannes Jäschke  
Norwegian University of Science and Technology (NTNU)

SIMC-Tuned PID Feedback Control Strategy in Fed-Batch Bioreactors  
Pedro A. Lira-Parada and Nadav Bar  
Norwegian University of Science and Technology (NTNU)

Combining Safety and Control using System Theoretic Process Analysis and Adaptive Control  
Sveinung Ohrem, Hyangju Kim, Christian Holden, and Mary Ann Lundteigen  
Norwegian University of Science and Technology (NTNU)

Optimal Operation using Classical Advanced Control Structures  
Adriana Reyes-Lúa, Cristina Zotica, and Sigurd Skogestad  
Norwegian University of Science and Technology (NTNU)

Robust Optimization of a Gasoline Blending System  
Mandar Thombre and Johannes Jäschke  
Norwegian University of Science and Technology (NTNU)
Future Directions in Control Relevant Models for Granulation Loop in Fertilizer Production
Ludmila Vesjolaja¹, Bjørn Glemmestad², and Bernt Lie¹
¹ University College of Southeast Norway; ² Yara Technology Centre, Norway

Comparing Water Treatment Topologies in Recirculating Aquaculture Plants
Simon Pedersen and Torsten Wik
Chalmers University of Technology, Sweden

Utilization of Generic Consumer Modeling in Planning and Optimization of District Heating and Cooling Systems
Khalid Tourkey Atta and Wolfgang Birk
Luleå University of Technology, Sweden

Integrating Microbial Genome-Scale Flux Balance Models with Jmodelica and the Bioprocess Modelica Library
Jan Peter Axelsson
Vascaia AB, Sweden