International Workshop on Assessment and Future Directions of Nonlinear Model Predictive Control

Each of the keynote talks is of 45 minutes length, followed by a 5 minute discussant statement, as well as 10 minutes of open discussions. Each invited main talk is of 30 minutes including discussion. All other contributions selected for presentation are of 20 minutes length, including discussion. We have five poster sessions, including a 3 minute short presentation for every poster.

The detailed program can be found below.

Preliminary Program

Friday 5 September (Aula Volta)

17:30- 18:30 Registration
18:30 – 19:00 Open ceremony
19:00 – 20:00 Optimizing process economic performance using model predictive control
  James B. Rawlings
  Discussant: Wolfgang Marquardt
20:00 – 22:00 Welcome dinner

Saturday 6 September

9:00 – 10:00 Explicit Model Predictive Control: A Survey
  Alessandro Alessio and Alberto Bemporad
  Discussant: Manfred Morari

10:00 – 10.30 Coffee Break

10:30 – 11:00 Use of Off-Line Optimization for Nonlinear Model Predictive
  Jay H. Lee, Wee Chin Wong

11:00 – 11:20 Explicit Approximate Model Predictive Control of Constrained Nonlinear Systems with Quantized Input
  Alexandra Grancharova and Tor A. Johansen

11:20 – 11:40 Nonlinear Multiparametric Model-based Control
  Stratos Pistikopoulos, Diogo Narciso, Nuno Faisca, Konstantinos Kouramas

11:40 – 12:10 Approximate Explicit Model Predictive Control
  Manfred Morari, Colin Jones and Melanie Zeilinger

12:10 – 12:40 Presentations poster session I
  PI1 Parametric Approach to Nonlinear Model Predictive Control
    Martin Herceg, Michal Kvasnica, and Miroslav Fikar
  PI2 Explicit Receding Horizon Control of Automobiles with Continuously Variable Transmissions
    Takeshi Hatanaka, Teruki Yamada, Masayuki Fujita, Sigeru Morimoto and Masayuki Okamoto
  PI3 The potential of auto-tuned MPC based on minimal plant information
    G. Valencia-Palomo, J.A. Rossiter
  PI4 Further results on "Robust MPC using Linear Matrix Inequalities"
    M. Lazar, W.P.M.H. Heemels, D. Munoz de la Pena, T. Alamo
  PI5 Nonlinear Model Predictive Control for Periodic Systems using LMIs
    Marcus Reble, Christoph Böhm and Frank Allgöwer
PI6 Optimizing Control of SMB Processes with Endpoint Constraints
Achim Kuepper, Le-Chi Pham, Sebastian Engell

PI7 Delay based model predictive control
Sorin Olaru, Silviu-Iulian Niculescu and Slavica Marinkovic

PI8 Nonlinear model predictive control for type 1 diabetes
L. Magni, D. M. Raimondo, C. Dalla Man, G. De Nicolao, B. Kovatchev, C. Cobelli

PI9 NMPC for MIMO drug dosing control in ICU patients
S. Syaffie and J. Nino, C. Ionescu, and R. De Keyser

PI10 Optimizing NMPC of a gasoline engine
Bart Saerens, Moritz Diehl, Jan Swevers and Eric Van den Bulck

12:40 – 14:30 Lunch and posters visit

14:30 – 15:00 Stabilizing Nonlinear Predictive Control over Non-deterministic Networks
Rolf Findeisen and Paolo Varutti

15:00 – 15:30 Lyapunov-based Model Predictive Control of Networked Systems
Panagiotis D. Christofides, David Muñoz de la Peña and Jinfeng Liu

15:30 – 15:50 Receding horizon optimization for control and reconfiguration of multisensor schemes
Sorin Olaru, Jose A. De Dona and Maria M. Seron

15:50 – 16:10 Coffee break

16:10 – 16:30 State estimation IS the real challenge in NMPC
Bjarne Foss, Steinar Kolaas and Tor S. Schei

16:30 – 16:50 Integration of model-predictive scheduling, real-time optimization, and output tracking
Jan Busch and David Elixmann and Wolfgang Marquardt

16:50 – 17:20 Faster, Easier, Cheaper, Safer
Eric C. Kerrigan

17:20 – 17:50 Presentations poster session II

PII1 Contraction Based Model Predictive Control
Keunmo Kang and Robert R. Bitmead

PII2 Robust nonlinear model predictive control with integral sliding mode for systems with matched disturbance
M. Rubagotti, D. M. Raimondo, A. Ferrara, L. Magni

PII3 Receding Horizon Maneuvering of the Rolling Torus
John Hauser

PII4 State Estimation and Fault Tolerant Nonlinear Predictive Control of an Autonomous Hybrid System Using Unscented Kalman Filter
J. Prakash, Anjali P. Deshpande, Sachin C. Patwardhan

PII5 Approximate On-line Estimation of Uniform State Model with Application on Traffic Data
Lenka Pavelkova

PII6 Spacecraft Attitude Control with NMPC Using Only Magnetic Actuators
Christoph Böhm, Moritz Merk, Frank Allgöwer

PII7 Networked Decentralized MPC of Cascaded Interacting Nonlinear Processes
Massimo Vaccarini, Sauro Longhi

PII8 Predictive Power Control of Wireless Sensor Networks for Closed Loop Control
Daniel E. Quevedo, Anders Ahlen and Graham C. Goodwin

PII9 Stabilization of Networked Control Systems by means of a Receding Horizon Strategy
R. H. Gielen, S. Olaru, M. Lazar

17:50 – 19:30 Posters visit and meetings

19:30 – 21:00 Dinner

Sunday 7 September

9:00 – 10:00 Input-to-State Stability: an unifying framework for Robust Model Predictive Control
D. Limon, T. Alamo, D. M. Raimondo, J. M. Bravo, D. Muñoz de la Peña and E.F. Camacho
Discussant: David Mayne
10:00 – 10.30     Coffe Break
10:30 – 11:00     Set Theoretic Methods in Model Predictive Control
                   Sasa V. Rakovic
11:00 – 11:30     Self-optimizing Robust Nonlinear Model Predictive Control
                   M. Lazar, W.P.M.H. Heemels, A. Jokic
11:30 – 11:50     Enlarging the terminal region of NMPC with parameter-dependent terminal control law
                   Shuyou Yu, Hong Chen, Christoph Bohm, Frank Allgower
11: 50 – 12:20    Hierarchical Model Predictive Control of Wiener Models
                   Riccardo Scattolini, Carlo Romani
12:20 – 12:50     Presentations poster session III

PIII1 Integrating MPC and RTO in the process industry by economic dynamic lexicographic optimization; an open-loop exploration
                   A.E.M. Huesman, O.H. Bosgra and P.M.J. Van den Hof
PIII2 Nonlinear Model Predictive Control of a Water Distribution Canal Pool
                   J. M. Igreja, J. M. Lemos
PIII3 Maximum Power Targeting for the PEM Fuel Cell using an NMPC Framework
                   Chrisovalantou Ziogou, Spyros Voutetakis, Simira Papadopoulou, Panos Seferlis
PIII4 Robust Nonlinear Model Predictive Control: A Multi-Model Non-Conservative Approach
                   Kai Dadhe and Sebastian Engell
PIII5 Design of a Robust Nonlinear Receding-Horizon Observer - First-order and second-order Approximations
                   G. Goffaux, A. Vande Wouwer
PIII6 Nonlinear Model Predictive Control for Resource Allocation
                   A. Alessandri, C. Cervellera, M. Cuneo, M. Gaggero
PIII7 An NMPC Approach to Avoid Weakly Observable Trajectories
                   Christoph Böhm, Felix Hess, Rolf Findeisen, Frank Allgöwer
PIII8 State Estimation in Nonlinear Model Predictive Control, Unscented Kalman Filter Advantages
                   Giancarlo Maraffioti, Morten Hovd and Sorin Olaru
PIII9 Nonlinear Moving Horizon Estimation with Parameter Jump Detection
                   Niels Haverbeke, Moritz Diehl, Bart De Moor
PIII10 Unconstrained NMPC Based on a Class of Weiner Models: A Closed Form Solution
                   Shraddda Deshpande and Sachin C. Patwardhan

12:50 – 14:00     Quick buffet lunch and posters visit
14:00 – 14:30     Multiple Model Predictive Control of Nonlinear Systems
                   Matthew Kuure-Kinsey and B. Wayne Bequette
14:30 – 14:50     Stabilization of Networked Control Systems by Nonlinear Model Predictive Control: a Set Invariance Approach
                   Gilberto Pin, Thomas Parisini
14:50 – 15:10     An off-line formulation of receding horizon control for nonlinear systems using sum of squares
                   Giuseppe Franze', Alessandro Casavola, Domenico Famularo, Emanuele Garone
15:15 – 17:15     Visit to Certosa di Pavia
17:15 – 24:00     Visit with dinner to Cantina Montù Beccaria

Monday 8 September

9:00 – 10:00     Efficient Numerical Methods for Nonlinear MPC and Moving Horizon Estimation
                   M. Diehl, Hans Joachim Ferreau, Hans Georg Bock, Niels Haverbeke, and Boris Houska
                   Discussant: Toshiyuki Ohitsuoka
10:00 – 10.20     Coffe Break
                   V. M. Zavala and L. T. Biegler
10:50 – 11:20     A Framework For Monitoring Control Updating Period in Real-Time NMPC Schemes
                   Mazen Alamir
11:20 – 11:40     NMPC with Bang-Bang and Affine Optimal Control Parameterizations: Application to Fast
Vehicle Formations
Fernando A.C.C. Fontes, D.B.M.M. Fontes, A.C.C. Caldeira

11:40 -12:10 Practical Issues in Nonlinear Model Predictive Control: Real-Time Optimization and Systematic Tuning
Toshiyuki Ohtsuka, Kohei Ozaki

12:10 – 12:40 Presentations poster session IV

PIV1 Fast Nonlinear Model Predictive Control via Set Membership approximation: an overview
Massimo Canale, Lorenzo Fagiano, Mario Milanese

PIV2 Fast Nonlinear Model Predictive Control with Applications in Mechanical Engineering

PIV3 Adaptive Model Predictive Control of Piecewise Affine Systems
Michal Kvasnica, Martin Herceg, Lubos Cirka, Miroslav Fikar

PIV4 Moving horizon nonlinear Hinf control based on T-S
Shuyou Yu, Hong Chen, Frank Allgower

PIV5 MPC for tracking of constrained nonlinear systems
D. Limon, A. Ferramosca, I. Alvarado, T. Alamo, E. F. Camacho

PIV6 Sufficient conditions for which MPC converges to the correct target
Leo RE Shead, Kenneth R Muske, Anthony J Rossiter

PIV7 A flatness-based iterative method for reference trajectory generation in constrained NMPC
F. Suryawan, J. De Dona, M. Seron, and J. Levine

PIV8 Nonlinear model predictive path-following control
Timm Faulwasser, Rolf Findeisen

PIV9 A Runge-Kutta based Software Package for Nonlinear Model Predictive Control
John Bagterp Jørgensen

PV10 A Matlab Environment for Nonlinear Model Predictive Control
Eugene van Wyk and Eric Kerrigan

12:40 – 14:00 Lunch and posters visit

14:00 – 14:30 Some Challenges in Nonlinear MPC with Probabilistic Uncertainty
Graham C. Goodwin, Jan Ostergaard, Daniel E. Quevedo

14:30 – 15:00 Successive linearization NMPC for a class of stochastic nonlinear systems
Mark Cannon, Basil Kouvaritakis and Desmon Ng

15:00 – 15:20 Stochastic solution methods for stochastic MPC
N. Kantas, J.M. Maciejowski, A. Lecchini-Visintini

15:20 –15:40 Coffee break

15:40 – 16:40 Nonlinear Model Predictive Control in Industrial Practice
E. Gallestey
Discussant: Jay H. Lee

16:40 – 17:10 Adaptice Robust MPC of Uncertain Nonlinear systems
M. Guay, D. Dehaan, V. Adetola

17:10 – 17:30 A Rational Constraint Handling NMPC Method for Systems With Limited Degrees of Freedom
Timur Aliyev and Edward Gatzke

17:30 – 17:50 Swelling constrained control of an industrial batch reactor using a dedicated NMPC environment: OptCon
Levente L. Simon, Zoltan K. Nagy, Konrad Hungerbuehler

17:50 – 18:20 Presentations poster session V

PV1 Stochastic Optimisation for Nonlinear Stochastic MPC
E. Siva, P. Goulart and J.M. Maciejowski

PV2 Nonlinear MPC using a Linear Parameter Varying Model
Zuhua Xu, Yucai Zhu, Jun Zhao, Jixin Qian

PV3 Receding Horizon Control for Linear Periodic Time-Varying Systems, Subject to Input Constraints
Benjamin Kern, Christoph Böhm, Rolf Findeisen, Frank Allgöwer

PV4 Design of Constrained Nonlinear Model Predictive Control based on Global Optimisation
Michal Čižniar and Miroslav Fikar and Razak Latifi
PV5 A nonlinear model predictive controller for the start-up of a open plate reactor
Miguel R. Rodriguez and Cesar de Prada and Antonio A. Alonso and Carlos Vilas and
Miriam R. Garcia
PV6 An application of receding-horizon neural control in humanoid robotics
S. Ivaldi, M. Baglietto, G. Metta, R. Zoppoli
PV7 Nonlinear Model Predictive Control of Municipal Solid Waste Combustion Plants
Martijn Leskens, Ruud J.P. van der Linden, Robert van Kessel, Okko H. Bosgra and Paul M.J.
Van den Hof
PV8 Particle Swarm Optimization based NMPC. An application to District Heating Networks
Guillaume Sandou, Sorin Olaru
PV9 Nonlinear model predictive control of diesel hydodesulfurization
Andrey Romanenko, Nuno Pedrosa, João Leal, Lino Santos, Radu Serban
PV10 NMPC for Load Acceptance Without Exhaust Gas in Marine Diesel Engines
George Papalambrou and Nikolaos Kyrtatos

18:20 – 18:50 Poster visit
18:50 – 19:30 Closing session
19:30 – 21:00 Dinner

Tuesday 9 September
Departure