Organisational information

For registration please use the registration form which is available on the ECPE web page: www.ecpe.org
> ECPE Events > ECPE Workshops: ECPE Workshop: Model Predictive Control in Power Electronics > Registration Form

www.ecpe.org/ecpe-events

Deadline for registration:

- **1 December 2016**

Participation fee:

- **€ 595,–** * for industry
- € **445,–** * for universities/institutes
- **€ 150,–** * for students/PhD students
  (copy of student ID requested)
  (limited number only)
  (optional dinner: € 50,-* extra fee)

  *plus 19 % German VAT

- The participation fee includes dinner, lunch, coffee/soft drinks and an USB drive with the workshop presentations. Students/PhD students can book the dinner for an extra fee of € 50,-*.
- A printed version of the workshop handout is available on request (€ 50,-*).
- With the confirmation of registration by email you are registered for the workshop and the invoice will be sent by post.
- Three participants from each ECPE member company free of charge. Allocation in sequence of registration.
- Further information (hotel list and maps) will be provided after registration and is available on the ECPE web page.
- In case of cancellation later than two weeks before beginning or non-attendance 50 % of the participation fee is payable.

Organisational information

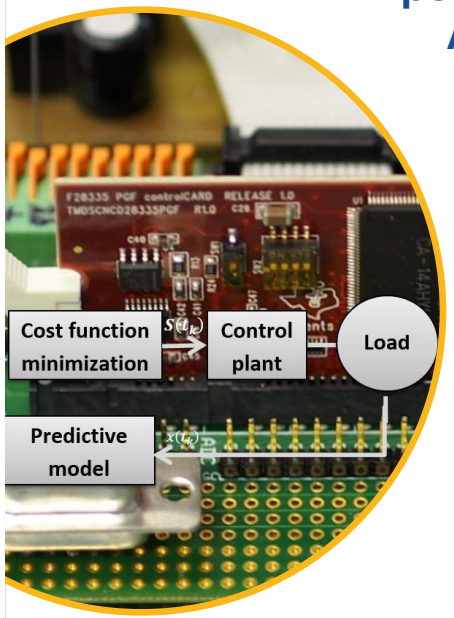
Organiser	ECPE e.V. 90443 Nuremberg, Germany www.ecpe.org
Chairmen	Prof. Ralph Kennel Technical University of Munich (D) Dr. Tobias Geyer ABB Corporate Research (CH)
Organisation	Lena Somschor, ECPE e.V. +49 (0)911 / 81 02 88 – 18 lena.somschor@ecpe.org
Workshop concept	Dr. Andreja Rojko, ECPE e.V. +49 (0)911 / 81 02 88 – 21 andreja.rojko@ecpe.org
Venue	NH Hotel Nürnberg City Bahnhofstraße 17-19 Nuremberg Germany

ECPE
European Center for
Power Electronics e.V.

Draft Programme

ECPE Workshop

Model Predictive Control in Power Electronics - Expectations and Applications



7 – 8 December 2016
NH Hotel
Nuremberg
Germany

in cooperation with

Cluster Leistungselektronik
ABB
TECHNISCHE UNIVERSITÄT MÜNCHEN
ECPE

ECPE Workshop

Model Predictive Control in Power Electronics - Expectations and Applications

7 – 8 December 2016
Nuremberg, Germany

Model Predictive Control (MPC) is a conceptually simple yet powerful methodology to control power converters and electric drives. It has many advantages over traditional controllers including its capability to intuitively handle a great variety of control problems by considering different modes of operation and directly incorporating system constraints and additional requirements. MPC minimizes an objective (cost) function subject to the plant model dynamics to obtain the control action. The underlying concepts are intuitive, the resulting controllers are inherently stable and, once calculated, easy to implement. The advances in processing power of digital signal processors have recently promoted MPC into the first commercial applications, which opened a door toward improved performance and efficiency of power electronic converters and drives demanded by the evolving industry applications.
The motivation for this workshop is to facilitate wider and faster exploitation of MPC by bridging the gap between theory and successful industrial implementation through cooperation and exchange of experience between academic/research and industrial communities.
The introduction session presents basic principles and methods of MPC with a view toward applications in power electronics and drives. Three different sections focus on different application areas and other important topics. Application examples, including the first commercial application on large variable speed drives (ABB), will be presented and discussed. The difference in control processing between conventional control methods and MPC algorithms will be shown and hints for effective implementation will be shared.

The workshop is chaired by
Prof. Ralph Kennel, Technical University of Munich (D)
Dr. Tobias Geyer, ABB Corporate Research (CH)

All presentations and discussions will be in English language.

Programme

Wednesday, 7 December 2016

9:00 Start of Registration

9:30 **Welcome, Opening**
A. Rojko, ECPE (D)

MPC a Powerful Method to Control Power Converters and Drives

9:40 **Predictive Control – Why and How?**
R. Kennel, Technical University of Munich (D)

10:20 **Model Predictive Control in Power Electronics: An Introduction**
T. Geyer, ABB's Corporate Research Centre (CH)

11:00 Coffee Break

MPC a Powerful Method to Control Power Converters and Drives (Continuation)

11:20 **Model Predictive Control Design for Power Electronics: Perspectives and Challenges**
D. Quevedo, Paderborn University (D)

11:50 **Explicit Model Predictive Control: A Solution to which Problems?**
S. Mariethoz, Bern University of Applied Science (CH)

12:20 **Discussion**

12:30 Lunch

MPC in Electric Drives

13:40 **Predictive Control – Can We Really Gain More?**
R. Kennel, Technical University of Munich (D)

14:10 **Managing the Megawatts Every Day with MPC**
P. Joerg, ABB MV Drives (CH)

14:50 **Discussion**

15:00 Coffee Break

MPC in Electric Drives (Continuation)

15:30 **Constraint Management of Cascade-Free Speed Control of PMSM Drive**
V. Šmídl, L. Adam, Z. Peroutka, S. Janouš, University of West Bohemia (CZ)

16:00 **Model-Based Control of an Induction Machine**
V. Staudt, Ruhr-Universität Bochum (D)
C. Heising, Avasition (D)

16:30 **Discussion**

MPC in Power Electronics Converters

16:40 **Model Predictive Control of Optimized Pulse Patterns**
T. Geyer, ABB Corporate Research (CH)

17:10 **Discussion**

17:30 **End of 1st Workshop Day**

19:30 Dinner at Restaurant *Literaturhaus*
Nuremberg, Germany

Programme

Thursday, 8 December 2016

MPC in Electronics Converters (Continuation)

8:30 **Predictive Control of Current-Source Active Rectifier**
J. Michalík, V. Šmídl, Z. Peroutka, University of West Bohemia (CZ)

9:00 **Computationally Efficient Long-Horizon Direct Model Predictive Control**
P. Karamanakos, Tampere University of Technology (FI)

9:30 **Control of Modular Multilevel Converter for DC-Power Transmission**
C. Heising, Avasition (D)
V. Staudt, Ruhr-Universität Bochum (D)

10:00 **Discussion**

10:10 Coffee Break

Implementation and Special Topics

10:40 **Introduction**
D. Quevedo, Paderborn University (D)

10:50 **Model Predictive Hysteresis Current/Torque Control for Wide Speed Operation of Synchronous Reluctance Motor Drives**
S. Bolognani, University of Padova (IT)

11:20 **Control Processing Requirements for a High Performance DSP System Capable for MPC**
N. Graß, Technische Hochschule Nürnberg (D)

11:50 **TBD**

12:20 **Discussion**

12:30 Lunch

Implementation and Special Topics (Continuation)

13:40 **Control and Stability of DC Catenary Fed AC Traction Drive**
Š. Janouš, V. Šmídl, Z. Peroutka, University of West Bohemia (CZ)

14:10 **Finite Control States Set MPC of 3-level 4-leg Flying Capacitor Converter Operating as a Shunt Active Power Filter**
K. Antoniewicz, Warsaw University of Technology (PL)

14:40 **Prediction and fast reaction model to maintain voltage stability with reduced DC-Link Capacity in high dynamic Applications**
J. Göppert, Lorch Schweißtechnik (D)

15:10 **Final Discussion**

15:30 End of Workshop