

Organisational Information

Sign up at: www.ecpe.org/events

Registration Deadline:

7 February 2023

Participation Fee:

€ 670,- * for industry

€ 520,- * for universities/institutes

€ 180,- * for students/PhD student
(limited spaces; copy of students ID
required; dinner 50,-*)

* plus VAT

- The participation includes dinner, lunches, coffee/soft drinks and digital proceedings. The reduced (PhD) students fee includes all except for dinner (can be booked for an extra fee of € 50,-*)
- Digital proceedings will be provided by download link latest one day before start of the event. A printed handout is available on request (€ 50,-*).
- Upon receipt of registration confirmation via email you are signed-up for the event. The invoice will be sent via email.
- 25 % discount for participants from ECPE member companies.
- 10% discount on university/institute fee for participants from ECPE competence centres.
- Further information (hotel list and maps) will be provided after registration and can be found on the ECPE web page.
- Cancellation policy: Full amount will be refunded in case of cancellation upon to 2 weeks prior to the event. After this date 50 % of the fee is non-refundable (replacement is possible).

10/02/23

Organisational Information

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Johannes Jaeschke, Fraunhofer IZM
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Venue Aalborg University
Auditorium C004, AAU Innovate
Thomas Manns Vej 25
9220 Aalborg, Denmark



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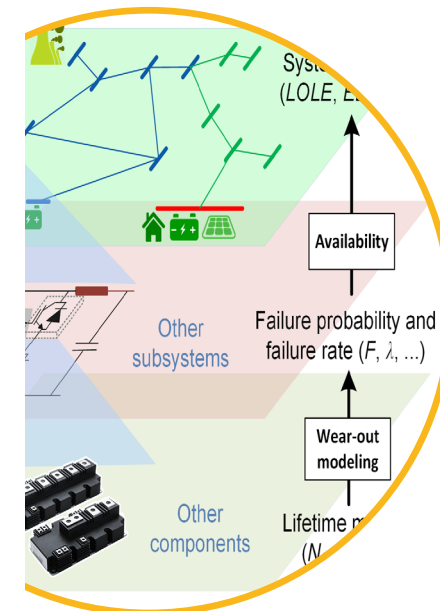


European Center for
Power Electronics e.V.

ECPE Tutorial

Reliability of Power Electronics - Part 2: Robustness and System Reliability

15 – 16 February 2023
Aalborg, Denmark



Reliability of Power Electronics - Part 2: Robustness and System Reliability

15 – 16 February 2023
Aalborg, Denmark

Electrifying the world is one of the pragmatic solutions for reducing carbon footprint. Electric transportation, renewable energy generation, electric storage, smart and micro grid technologies, as well as digitalization are essential parts of sustainable electricity systems. These technologies are underpinned by power electronics as the core of their energy conversion process. The overall performance of modern energy systems relies on the reliable operation of power electronics which needs accurate and optimized design, planning and control of power converters.

This tutorial is divided into two parts: This second part "Reliability in Power Electronic Systems" briefly repeats some basics on reliability covered in part one "Reliability in Power Electronic Converters" and then goes on with specific aspects for systems reliability. Here, also fundamentals in artificial intelligence are introduced, case studies which use artificial intelligence for condition monitoring and intelligent maintenance are presented.

It aims to present the latest advances in physics-based reliability modelling and analysis in modern power electric based power systems (PEPS). Furthermore, the model-based techniques to cost-effectively enhance the reliability of power electronic systems will be addressed. Several examples will be provided illustrating the importance of power electronics reliability in overall power system performance as well as the effectiveness of the techniques in enhancement of overall system reliability.

The main goals as:

- Understanding reliability engineering and probabilistic analysis application in PEPS
- Model-based hierarchical reliability assessment in PEPS from device to power system level
- Model-based reliability management and enhancement in PEPS including design for reliability, control for reliability, and maintenance planning

This tutorial covers comprehensive concepts of reliability modelling, analysis and enhancement in power electronic based power systems. Therefore, it would be fruitful for graduate students and senior researchers both from industry and academia who are interested in converter design, grid modernization, reliability modeling and enhancement in power electronics based power systems.

Prerequisite: Visiting Part one "Reliability in Power Electronic Converters" is strongly recommended.

All presentations and discussions will be in English.

Programme

Wednesday, 15 February 2023

09:30 Registration & Welcome Coffee

10:00 Welcome, Opening
Gudrun Feix, ECPE e.V.

10:10 Wrap-up Part 1
- Basic Terms and Definition
- Failure Mechanism
- Module/ Device Reliability Models
Olaf Wittler

11:10 Fundamental Concepts of Reliability Engineering
- Definition of Reliability
- Device Level Reliability
- Converter Level Reliability
- System Level Reliability
- Fundamentals of Artificial Intelligence
Frede Blaabjerg, Huai Wang

13:00 Lunch

14:00 Model-based Hierarchical Reliability Analysis in PES
- Structural reliability and stress-strength analysis
- Availability modelling with non-constant failure rates
- Power system reliability – systematic analysis
- Incorporating power electronics reliability into power system reliability
Saeed Peyghami

15:30 Coffee Break

16:00 Model-based Hierarchical Reliability Analysis in PES – Cont.
Saeed Peyghami

17:30 End of 1st Day

19:30 Dinner
Duus Vinkjælder | Østerågade 9

Programme

Thursday, 16 February 2023

09:00 Start of 2nd Day

09:00 Reliability and Availability Enhancement Techniques in PES – 1
- Impact of control on PES reliability
- Model-based design for reliability
- Model-based maintenance for planning
Saeed Peyghami

11:00 Coffee Break

11:20 Reliability and Availability Enhancement by Condition Monitoring in PES
- Basics of physics-of-failure and data based monitoring approaches
- Strategies for RUL (Remaining Useful Lifetime) Calculation
- Condition monitoring based on damage sensitive indicators
Johannes Jaeschke

12:50 Lunch

13:50 Application Specific Reliability - Wind Power
Kristian Bonderup Pedersen

14:35 Application Specific Reliability – Automotive
Olaf Wittler

15:20 Wrap up 2nd Day, Final Discussion, Feedback

15:50 End of Tutorial

The workshop is chaired by:

Prof. Frede Blaabjerg, Aalborg University (DK)
Dr. Johannes Jaeschke, Fraunhofer IZM (DE)
Dr. Olaf Wittler, Fraunhofer IZM (DE)
Dr. Kristian Bonderup Pedersen, Vestas Wind (DK)
Dr. Saeed Peyghami, Aalborg University (DK)
Prof. Huai Wang, Aalborg University (DK)