



DEPARTMENT OF ENERGY TECHNOLOGY
AALBORG UNIVERSITY

PhD Public Defence

Title: Mission Profile-based System-Level Lifetime Prediction of Modular Multilevel Converters

Location: Pontoppidanstræde 111, auditorium

Time: Monday 27 January at 13.00

PhD defendant: Yi Zhang

Supervisor: Professor Frede Blaabjerg

Moderator: Associate Professor Tamas Kerekes

Opponents: Associate Professor Amjad Anvari-Moghaddam, Dept. of Energy Technology, Aalborg University (Chairman)
Professor Bhim Singh, Indian Institute of Technology Delhi, India
Professor Axel Mertens, Leibniz Universität Hannover, Germany

All are welcome. The defence will be in English.



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Abstract:

How to size the major devices/components of the MMC with compromised costs and design margins, while fulfilling a specific reliability target is one of the challenges for Modular Multilevel Converters (MMCs). To cope with the challenge, a systematic reliability evaluation is a prerequisite. This PhD project firstly studies the system-level power loss model for all major components in MMCs. Then, the electro-thermal modelling of the MMC is investigated. Based on these two models, a mission profile-based lifetime prediction method is proposed for the MMC system. The outcomes serve as a first step for developing realistic reliability analysis and model-based design methods for full-scale MMCs in practical applications. All the research developments have been verified by simulations and experiments. The contributions have been presented in 5 journal and several conference papers.