



The
University
Of
Sheffield.

Automatic
Control and
Systems
Engineering

The Department of Automatic Control & Systems Engineering
is pleased to announce the following seminar:

Advanced Control of Power Converters to Reduce Total Capacitance, Voltage Ripples and Leakage Currents

Mr Wen-long Ming

Research Associate,

Department of Automatic Control and Systems Engineering

The University of Sheffield

Wednesday, 25 November 2015 at 14:00

LT2, The Diamond

Abstract

Power systems are going through a paradigm change from centralized generation to distributed generation and further onto smart grids, where power electronics converters (PEC), instead of electrical machines, will be the main players. Numerous control methods, topologies, and modulation strategies have been recently proposed to improve power density, efficiency, reliability, and costs of PEC. However, two major challenges remain as critical obstacles to further advance these. The first challenge is the bulky electrolytic capacitors used to reduce voltage ripples, which are the most vulnerable components in PEC. They can cause about 30% of failures, and occupy 83% of the volume in a 15 kW power converter. The second challenge is the inefficient and bulky isolation transformers used to cut off the path of leakage currents. Such transformers can account for about 3% of system power losses, over 60% of weight, and over 50% of volume in a 6 kW PV inverter. In order to overcome these two challenges, some recently-developed active control and topological design technologies will be presented, which, for the first time, innovatively address the two fundamental challenges in a holistic way. Particularly, some power converters equipped with advanced controllers and the corresponding experimental results will be presented with emphasis on different renewable energy applications such as microgrids and photovoltaics (PV) systems.

Biography

Wen-Long Ming received his B.Eng. and M.Eng. Degrees in Automation from Shandong University, Jinan, China, in 2007 and 2010, respectively. He received the Ph.D. degree in Automatic Control and Systems Engineering at the University of Sheffield in 2015, where he is currently working as a Research Associate. He was a visiting scholar at Center for Power Electronics Systems (CPES), Virginia Tech, Blacksburg, USA in 2012. He has (co-)authored more than 30 papers published in leading journals or refereed IEEE conferences and a research monograph 'Advanced Power Electronic Converters with Reduced Capacitance, Ripples and Common-mode Voltages' to be published by IEEE-Wiley Press. His research interests focus on smart grids, advanced control of power electronic converters, technologies to reduce passive components in power converters, traction power systems, transformerless PV inverters and neutral line provision in power electronic systems.