



The
University
Of
Sheffield.

Automatic
Control and
Systems
Engineering

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

Application of Robust Multivariable Control Systems Design in Voltage-Sourced Converters (VSCs)

Dr Sajjad Fekriasl

*Principal Technologist, Smart Grids
ALSTOM UK*

Wednesday, 28th October 2015 at 11:00
LT02, Pam Liversidge Building

Abstract

Despite many applications of vector control used in power systems and AC drives to name but a few, it is vital to draw attention when using such traditional control concepts to the Chainlink Voltage-Sourced Converters (VSCs), including Modular Multi-level Converters (MMCs). This is mainly because three phases of an MMC are not identical due to stochastic nature of the submodules switching in each phase. In addition, dissimilarity between arm reactors and cell capacitors lead to extra challenges for any vector control system such as generation of inevitable distortions at the AC voltage waveform posed by the converter – such issues can harm local transformers and even may lead to network instability when connected to weak AC systems. Thus, it is important to look for alternative solutions of control systems design for such challenging power conversion applications.

Synthesis of robust control systems for MMCs, developed in ALSTOM Grid (UK), seems a promising resource in legacy power electronics/systems control to aid operation of MMCs as well as their grid integration. In this course, the operation of all arms of the MMC is carried out via controlling the converter arm voltages in multi-input multi-output fashion. This will result in better handling the interactions between all converter arms and thus smooth operation of the converter. This talk will cover the key highlights in regard to theoretical developments of invented robust control systems design for VSCs/MMCs. Some of the results will be demonstrated to clarify and further discuss the above invention.

Biograph

Dr. Sajjad Fekriasl (Fekri) received the B.S.(Hons) and M.S.(Hons) degrees in Electrical Engineering from University of Tabriz, Iran, in 1995 and 1997, respectively. He received his PhD degree in Electrical Engineering and Computer Science, in 2006, from Instituto Superior Tecnico(IST), Lisbon, Portugal, under supervision of Prof. Michael Athans (Professor Emeritus of MIT, MA, USA). His PhD dissertation has pioneered a new engineering approach for the synthesis of Robust Adaptive Control Systems. Over the periods 1997-2001 and 2006-present, Sajjad has held a number of technical leadership and lectureship positions, mostly in the areas of control systems design for power systems, power electronics, automotive and aerospace control applications, in collaboration with well-known companies including BAE Systems and Jaguar and Land Rover. He is now Principal Scientist with Advanced Research and Technology (ART) centre, ALSTOM Grid, Stafford (2012-present). He has co-authored around 47 papers in journals or refereed IEEE conferences, and is inventor of several patent disclosures. His research interests cover the design and development of robust multivariable control systems and optimisation algorithms for power (conversion) systems, renewable generation systems, coordinated control, and multi-terminal HVDC networks.