Institute of mathematics & its applications

East Midlands Branch

Three topics in electrical system management

A talk by

Professor Robert S. MacKay FRS

(Director of Mathematical Interdisciplinary Research, University of Warwick)

Wednesday 18 October 2017 starting at 7.30 pm

Lecture Theatre 1, Ken Edwards Building,
University of Leicester

Abstract

With the move to more renewable sources of electricity, three things are becoming necessary:
1. storage systems
2. demand response
3. monitoring and control of oscillations in power flow.

Professor MacKay will give an overview of some mathematical work on these. Firstly, with Lisa Flatley and Mike Waterson, we have designed an algorithm for optimal use of an energy store; this can be used to maximise profit from variations in the price or to minimise variations in the mismatch between supply and demand. Secondly, with Ellen Webborn, we have analysed the effect of making thermostatically controlled loads frequency-sensitive; this can reduce variations in the mismatch between supply and demand but there are dangers that large uptake of frequency-sensitive technology could lead to instabilities; in our model the uniform distribution of phases appears to be stable and the fully synchronised one is unstable. Thirdly, I am developing a Gaussian process method to detect oscillations in power flow from phasor measurement unit data, and estimate their frequency, damping rate and mode shape; it is essential to detect these modes early enough to design control for them.

No charge is made to attend meetings, non-IMA members are welcome

The talk is coordinated by the East Midlands Branch Secretary,
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Web details of East Midlands events: http://ima.org.uk/activities/branches/east_midlands.cfm