

The following lecture is part of the 2009 Statistical Sciences Seminar Series (CCS-6).

Speaker: Gemma Stephenson, National Oceanography Centre, University of Southampton

Title: Using Derivative Information in the Statistical Analysis of Computer Models

Date: Monday, June 8

Time: 10:30 a.m.

Location: TA 3, Building 40, Room N125 (Moon Room)

Abstract:

Complex models are used in many areas, such as engineering and environmental science, to simulate the behaviour of real-world systems. These models are written as computer codes and referred to as simulators. Complex models may take an appreciable amount of computing time to run and in this sense they are expensive to execute. Performing analyses such as sensitivity and uncertainty analysis can require many runs of the simulator and this quickly becomes impractical with a computationally expensive model. Hence an emulator, which is a statistical approximator to the simulator, can be built to provide greater efficiency. A common approach is to model the simulator by a Gaussian process model and the emulator is built based on data collected from running the simulator at a specified, small number of input points.

It is possible to obtain derivatives of model outputs, for example through the adjoint of the model. The value of learning derivatives when building emulators is being investigated, to determine whether additional efficiency can be achieved. Furthermore, emulators can be employed to predict derivatives of model outputs. This is possible even without any previous derivative information and although this work is at an early stage, it has the potential to reduce the demand for writing and running adjoint models.

Bio:

Gemma Stephenson obtained her MMath (2006) from the University of Sheffield. The degree consisted of Pure Mathematics and Statistics and she spent the academic year 2004/05 in Germany studying Statistics at Dortmund University. Gemma is now a PhD student and part of the Managing Uncertainty in Complex Models (MUCM) project led by Tony O'Hagan. She spent year one of the PhD at The University of Sheffield working with Jeremy Oakley and is spending the rest of her PhD at the National Oceanography Centre, University of Southampton with her supervisor, Peter Challenor.