

CICADA Phd Studentship

Investigation of the dynamical behaviour of reduced order dynamical systems

The EPSRC-funded Centre for Interdisciplinary Computational and Dynamical Analysis (CICADA), based at the University of Manchester, offers a PhD studentship available from January 2009. The student will investigate the dynamical behaviour of hybrid systems, i.e. with both discrete and continuous components. The analysis and verification of hybrid systems in realistic applications, requires that we have techniques which are capable of dealing with systems with large numbers of continuous variables. Various methods exist for replacing the full dynamical system by a reduced order system which preserves important properties of the full system. This PhD project will investigate various methods of model reduction to compare how well they mimic the behaviour of the full system, for example with respect to responses to changes in input variables or control parameters.

CICADA is a newly formed centre at the University of Manchester at the boundary between mathematics, computer science and control engineering. The goal of the centre is to explore new mathematical and computational methods for analysing systems which have both continuous and discrete components and to develop adaptive methods for controlling such systems. The proposed PhD topic comes from Theme 3 of the CICADA programme, which explores the development of computational and numerical methods for investigating very large dynamical systems which typically arise from the modelling and simulation of systems abstracted from situations of scientific and industrial importance. Examples come from control methods in engineering, for example controllers for automated vehicles or manufacturing processes, systems biology, for example neuron spike signalling or gene expression networks, network engineering, for example control of water delivery networks or internet scale computer networks.

This is an exciting opportunity for a student of computer science, mathematics or engineering to develop their research skills in a multidisciplinary centre with critical mass in this emerging field. For more details of CICADA, please see <http://www.cicada.manchester.ac.uk>. The Director of CICADA is David Broomhead, Professor of Applied Mathematics. The other lead investigators are Howard Barringer, Professor of Computer Science, John Brooke, co-Director of e-Science North-West, Steve Furber FRS, FREng, ICL Professor of Computer Engineering, Paul Glendinning, Professor of Mathematics, Nick Higham FRS, Richardson Professor of Applied Mathematics, Jonathon Shapiro, Senior Lecturer in Computer Science, Hong Wang FIEEE, FInstMC, Professor in Process Control.

We are seeking a recent graduate with a good degree from mathematics or a discipline with a high mathematical content. Interest in dynamical systems and/or numerical methods would be highly advantageous. Informal enquiries should be made to Professor Dave Broomhead, email D.S.Broomhead@manchester.ac.uk, tel: +44 (0)161 3063680. The studentships pay fees at UK/EU rates and a

maintenance award level which is currently 12,940 per annum.