LTCC Basic Applied Course

Title: Exact Solution Methods for Differential Equations

Basic Details:
- Core Audience: First year or later, applied or pure
- Course Format: extended

Course Description:

This course will introduce two methods for finding (in some sense) explicit solutions to ordinary and partial differential equations. The first half of the course will concentrate on Lie's symmetry method. Most of the explicit methods seen in standard courses are special cases of this approach. The second approach uses singularity structure, especially the Painlevé property, to identify integrable differential equations and to find special solutions.

- Keywords: Differential equations, symmetries, Lie groups, the Painlevé property.
- Syllabus: <u>Part 1: Symmetries</u> - Applications of symmetries to ordinary and partial differential equations, finding infinitesimal generators, the exponential map from a Lie algebra to a Lie group. <u>Part 2: Singularity analysis</u> – Fixed and movable singularities, first-order ODEs, the Painlevé property, applications.

- Prerequisites: Standard undergraduate calculus of several variables and complex analysis.

Format:
- No of discussion/problem sheets: 4
- Electronic lecture notes: Yes
- Lecture/computer session/tutorial split: Five two-hour lectures. Some of this time will be devoted to discussing material in the problem sheets.

Lecturer Details:
- Lecturer: Rod Halburd
- Lecturer home institution: UCL
- Lecturer e-mail: R.Halburd@ucl.ac.uk
- Lecturer telephone number: 020 7679 2973