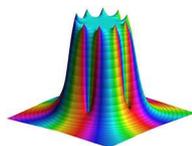# Effective Visualisation in the Mathematical Sciences
EViMS 2

The Australian National University
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This workshop took place over an extremely hot Canberra weekend in the Mathematical Sciences Institute (MSI). Despite the heat, all sessions from start to finish were well attended by the 23 participants and the quality of most of the presentations was excellent. This workshop was a sequel to EViMS held at the University of Newcastle in 2012. It is planned that EViMS events will provide an ongoing forum for mathematical researchers and educators with an interest in visualisation.

The goals of the meeting were to bring together experts from universities, schools and the private sector and to pool their knowledge on visualisation tools supporting mathematics teaching, experimental mathematics and visualisation as an aid in the proving of theorems.

The workshop had excellent keynote speakers in Elias Wegert (TU Bergakademie Freiberg) on exploring complex functions using phase plots, Peter Eades (University of Sydney) analysing what makes for a good diagram, Andrei Tetenov (Gorno-Altaisk University) showing 3D iterated function system attractors and Christoph Bandt (University of Greifswald) on the practical issues of visualising 'big data'. They were supported by 11 other speakers from Australia and overseas. A feature of the conference was seeing the practical results some speakers had achieved with computer-based tools. For example, Anthony Morphett (Melbourne) and Krzysztof Leśniak (Nicolaus Copernicus) both presented *GeoGebra* applets for teaching undergraduates, Andrei Tetenov presented results from *IFS-Builder 3D* and Elias Wegert showed what his MATLAB®-based, *Complex Function Explorer* could achieve.

The heart of the conference was the talk by Lilia Ferrario (ANU). She gave an overview of learning state-of-the-art showing there are three types of mathematical minds: an analytic type, a geometric type and a harmonic type, and two components of thinking processes: verbal-logical that enables people to work with

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abstract problems, and visual-pictorial which requires visualisation. The most effective teaching or any other type of presentation will include elements that present the material in ways that can be accessed efficiently by all the different types of student minds. The same ideas also apply in research, especially when the research involves very large amounts of data.

At the conclusion of EViMS 2 there was a great deal of enthusiasm from the participants that a third EViMS should be organised in two years time, probably at the University of Newcastle. The MSI will set up a website to provide a forum and a focus for people with an interest in visualisation between now and EViMS 3.

EViMS 2 was supported by AMSI, AustMS, CARMA, ANU and ACEMS. Further details are available at http://maths.anu.edu.au/evims-2 and the talks are available at http://maths.anu.edu.au/people/louisa-barnsley.