

Prof. Dana Murray

# Department of Mathematics and Applied Mathematics

## Overview

The Department of Mathematics and Applied Mathematics offers a wide range of courses at both undergraduate and postgraduate level. Many of the staff members are active in research and community service.

Prof. Schalk Schoombie, in collaboration with Prof. Eben Maré of the Department of Mathematics and Applied Mathematics at the University of Pretoria (UP), continued his investigation of non linear instabilities induced by spurious high frequency components in the numerical solution of certain non linear ordinary differential equations. In particular, the effect of using third and fourth order Nyström methods on the Van der Pol equation, as well as the Duffing equation and a predator-prey system were investigated. A further research article on this topic is in preparation.

In addition, Prof. Schoombie, in collaboration with Mr Christiaan Venter, continued a project funded by the National Research Foundation (NRF) on the use of computational adaptive dynamics in the modelling of evolution and adaptive processes in population modelling.

Prof. Jo Schröder attended the Colloquium on Combinatorics, an annual event held at various German universities for the last 25 years. The Otto-von-Guericke-University in Magdeburg, Germany hosted the conference. (Otto von Guericke was Mayor of Magdeburg at the end of the Thirty Years' War and is famous for his experiments on air pressure.) Prof. Schröder presented a lecture on Schröder numbers. After the conference he spent several weeks at the Free University of Berlin, Germany where he participated in talks and projects of the Discrete Mathematics section, and took part in a topology seminar.

Prof. Johan Meyer was elected as a member of the problems committee of the Pan African Mathematics Olympiad (PAMO). He was invited to Abuja, Nigeria in April 2007 to assist in the setting of the paper for the annual PAMO. He also helped to compile the final round paper for the senior division (Grades 10-12) of the South African Mathematics Olympiad.

Prof. Meyer attended the biennial International Conference on Near-rings and Near-fields in Linz, Austria where he

delivered a talk on bijective matrix maps and identity elements. He attended a symposium on training and research during the Pan African Mathematics Olympiad at the University of Ouagadougou, Burkina Faso, where he also delivered talks on mathematical inequalities.

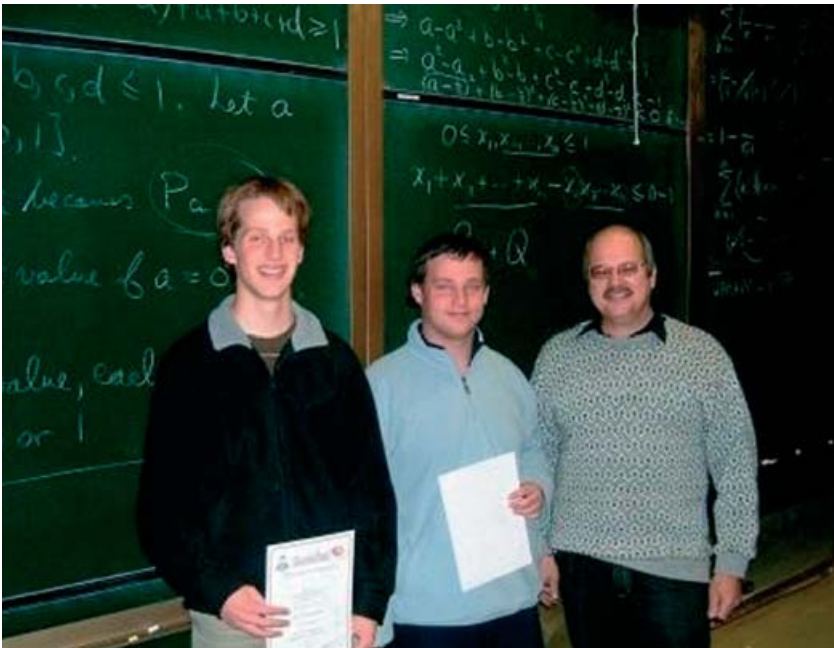
Prof. Meyer received a research visit from Prof. Jenő Szigeti of the University of Miskolc in Hungary during November 2007. The ideas that evolved from this visit will be pursued during a follow-up visit of Prof. Meyer to Prof. Szigeti.

Prof. Alain Clout continued his fundamental research on the topic of partial derivatives of non-integer orders and their applications in groundwater modelling. He began, in collaboration with colleague and M.Sc. student, Mr Willem van Wyk, to investigate the possibility of applying this concept in the field of Image Processing.

Prof. Thomas Acho continued to lecture on the Vista Campus, which was incorporated into the UFS in 2004, until June 2007 when he moved to the Main Campus. Prof. Acho attended the International Conference "Days on Diffraction" in St. Petersburg, Russia where he delivered a paper entitled: *Derivation of eigenvalues for the Sturm-Liouville boundary value problem with Interior Singularities*. During his visit to Russia he met and re-established contacts with several researchers and in particular with a prominent researcher on Diffraction Theory, Prof. Piergiorgio Uslenghi.

In the area of community service, Prof. Meyer and Mr Venter were closely involved with the Nautilus Mathematics Project, which is presented quarterly at the Brandwag Primary School in Bloemfontein and also on the university's Main Campus. The department, in co-operation with Nautilus, presented the KovsieNaut Mathematics Olympiad. Prof. Meyer set the paper and approximately 100 persons from across the Free State participated.

The department took part in the UFS 2007 Open Day and made an important contribution as one of the representatives of the Faculty of Natural and Agricultural Sciences at the 11th Science Festival (SciFest) held in Grahamstown in March 2007.



Prof. Johan Meyer congratulates the winners of the KvsieNaut Mathematics Olympiad.



Lecturers of the department during a visit to a game park.

## Staff

### Main Campus:

**Professors:** Profs Johan Meyer, Schalk Schoombie, Dana Murray, Alain Clout

**Associate Professor:** Prof. Thomas Acho

**Senior Lecturer:** Dr Hubertus Bargenda, Ms Julia van Niekerk

**Lecturers:** Dr Samantha Dorfling, Mr Christiaan Venter, Ms Ansa Kleynhans

**Temporary Lecturers:** Mss Magrietha Theron, Martie Calitz, Anita Swart, Marina Botha, Mr Ricus Erasmus

**Administrative Officer:** Ms Marinda Venter

### Qwaqwa Campus:

**Associate Professor:** Prof. Jo Schröder

**Temporary Lecturers:** Messrs Patrick Mbambo, Nallapan Sebastian, Neo Tsosane, Ms Christa Faber

## Contact details

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# Research outputs

## Research articles

**Acho, T.M.** 2007. Derivation of eigenvalues for the Sturm-Liouville boundary value problem with Interior Singularities. *Quarterly of Applied Mathematics* 65(2): 375-383.

**Schröder, J.** 2007. Delannoy and Tetrahedral numbers. *Commentationes Mathematicae Universitatis Carolinae* 48(3): 389-394.

**Schröder, J.** 2007. Generalized Schröder numbers and the rotation principle. *Journal of Integer Sequences* 10(7): 1-15.

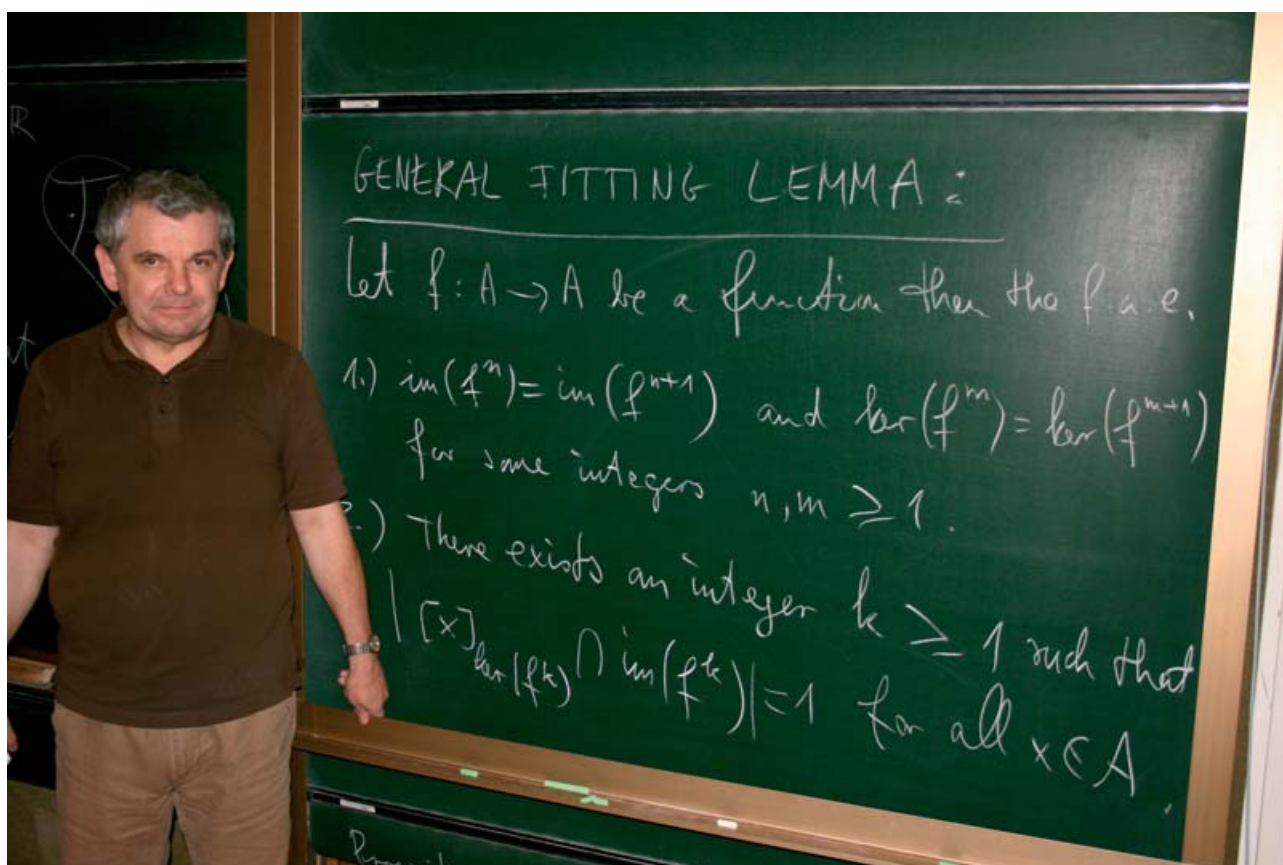
## Conference contributions

**Acho, T.M.** 2007. Derivation of eigenvalues for the Sturm-Liouville boundary value problem with Interior Singularities. Paper presented at the International Conference: Days on Diffraction, St. Petersburg, Russia. 28 May - 1 June.

**Meyer, J.H.** 2007. Bijective matrix maps and identity elements. Paper presented at the International Conference on Near-rings and Near-fields, Johannes Kepler University, Linz, Austria. 22-27 July.

**Schoombie, S.W. & Mare, E.** 2007. High frequency induced instability in some non linear numerical schemes. Paper presented at the South African Symposium for Numerical and Applied Mathematics, Stellenbosch, South Africa. 2-4 April.

**Schröder, J.** 2007. Generalized Schröder numbers and the rotation principle. Paper presented at the Kolloquium Kombinatorik, Magdeburg, Germany. 15-17 November.



Prof. Jenő Szigeti, of the University of Miskolc in Hungary, delivered a lecture entitled: The Fitting Lemma.