



**UNSW**  
THE UNIVERSITY OF NEW SOUTH WALES

## DEPARTMENT OF APPLIED MATHEMATICS APPLIED SEMINAR SERIES 2007

*The Seminar Series of the Department of Applied Mathematics, UNSW, Sydney is dedicated to the announcement, dissemination and discussion of research in mathematics and its applications. A fundamental aim of the Seminar Series is to feature lectures that inform in a manner that makes the subject accessible to the audience, including non-specialists.*

**SPEAKER:** Prof Ingo Müller, AMSI–MASCOS Distinguished Lecturer.

**TITLE:** Thermomechanics of Shape Memory Alloys – Phenomena, Simulation and Applications.

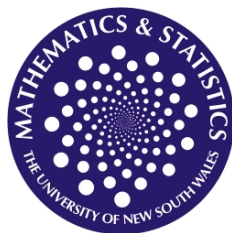
**Abstract:** The phenomena and some applications of shape memory alloys will be presented in a movie. The phenomenon is due to an austenitic–martensitic phase transition and therefore it may be treated with thermodynamic methods, properly adapted to the case of a hysteretic solid-solid transition in alloys. The thermodynamics of shape memory alloys will be presented on three levels:

A purely thermodynamic theory of the phase transition is formulated with an additional ingredient for the consideration of the pseudo-elastic hysteresis.

A kinetic theory of the transition provides some insight into the transition considered as an activated process. Given two out of three possible inputs as functions of time such as load and temperature –, the remaining one e.g. deformation – may be calculated as a function of time.

A molecular 2-dimensional simulation demonstrates how the lattice structure transforms and how twinning occurs. A statistical thermodynamic treatment of the molecular model provides reasonably good predictions for the transition temperatures.

**TIME AND VENUE:** 3pm, Tues 20 November 2007, Room 4082, Red Centre.



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