Laboratoire de Mécanique des Solides
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Interfaces et Couches Minces
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Parrainé par la Chaire André Citroën

Symposium Jean Mandel

Couplages Multiphysiques

Multiphysic Couplings

Jeudi 27 juin 2013

Amphithéâtre Gay-Lussac
École Polytechnique

Inscription gratuite sur simple email à symposium@lms.polytechnique.fr avant le 31 mai 2013
Free registration by email at symposium@lms.polytechnique.fr by May, 31st 2013
Contact : laurence.bodelot@polytechnique.edu

Plenary Lecture

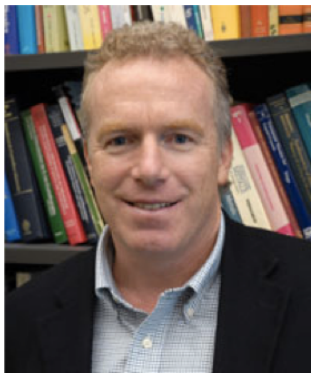
by Richard D. James

Compatibility, hysteresis and the direct conversion of heat to electricity

Big first order phase transformations in solids can still be highly reversible, if the lattice parameters are "tuned" to satisfy certain relations that promote the compatibility between phases. We outline the basic theory behind this tuning and give examples of recently discovered alloys. Some of these alloys have thermal hysteresis as low as 0.2°C despite having transformation strains greater than 8%. The lowered hysteresis correlates with the reversibility of the transformation under repeated cycling. We use this kind of tuning, together with the lattice parameter sensitivity of magnetic properties and the presence of a jump of lattice parameters at the phase transformation, to find some interesting new multiferroic Heusler alloys: briefly, multiferroism by reversible phase transformation. These alloys can be used in diverse ways for the direct conversion of heat to electricity, and provide interesting possible ways to recover the vast amounts of energy stored on earth at small temperature difference.

Richard D. James

Distinguished McKnight University Professor
Department of Aerospace Engineering and Mechanics
University of Minnesota, Minneapolis, USA



Professor Richard D. James received an undergraduate degree in Engineering in 1974 from Brown University and a graduate degree in Mechanical Engineering from Johns Hopkins University (Ph.D. 1979). He began his academic career in the Division of Engineering at Brown University in 1981 and joined the Aerospace Engineering and Mechanics department of the University of Minnesota in 1985.

Professor Richard D. James' main area of research is phase transformations in materials - especially shape memory and multiferroic materials - at large and small scales. This involves the development of mathematical methods for the analysis of materials at atomic and continuum scales, especially the development of multiscale methods for understanding the relation between the behavior of materials on different scales. It also involves advanced methods of bulk synthesis and characterization of new materials in his laboratory, guided by theory. His current research concerns the study of "Objective Structures", a mathematical way of looking at the structure of matter, and the direct conversion of heat to electricity using phase transformations in multiferroic materials.

Professor Richard D. James has authored or co-authored 120 articles, has given 40 plenary and named lectureships, and was awarded the Humboldt Senior Research Award in July 2006, the Warner T. Koiter Medal from ASME in 2008, the William Prager Medal from the Society of Engineering Science in 2008, and the Brown Engineering Alumni Medal in 2009.

Thursday, June 27, 2013 Program

Gay-Lussac Amphitheater

8:45 - 9:15 am	*Registration and Welcome Coffee*
9:15 - 9:30 am	**Welcome Address** by **Patrick Le Tallec**, LMS director
9:30 - 10:30 am	**Plenary Lecture** by **Richard D. James** *Compatibility, hysteresis and the direct conversion of heat to electricity*
10:30 - 11:00 am	*Coffee Break*
11:00 - 11:30 am	**Gérald Ndong** *Stress measurements in semiconductor materials through polarized Raman spectroscopy*
11:30 - 12:00 pm	**Dennis Lange** *Strain effects on semiconductor resistivity in thin film solar cells*
12:00 - 12:30 pm	**Stefano Bosia** *Influence of strain on the performance of semiconductor junctions*
12:30 - 2:00 pm	*Lunch in Salon de Marbre*
2:00 - 2:30 pm	**Tobias Pössinger** *Magneto-Rheological Elastomers (MRE): fabrication and experiments*
2:30 - 3:00 pm	**Evgeny Norman** *Carbon nanotube based devices: applications in logic devices and sensors*
3:00 - 3:30 pm	**Laurent Baraton** *Towards selective, carbon nanotube based, chemical sensors*
3:30 - 4:00 pm	*Coffee Break*
4:00 - 4:30 pm	**Hippolyte Djizanne** *Thermomechanical behavior of salt cavern used for underground storage of compressed air*
4:30 - 5:00 pm	**Barbara Lynch** *Multi-scale analysis of the biomechanical properties of skin*
5:00 - 5:30 pm	**Claire Dupont** *Biomechanics of capsules and cells in flow*
5:30 - 5:45 pm	**Closing Address** by **Patrick Le Tallec**

Jean Mandel

Founder of the Laboratoire de Mécanique des Solides

After brilliant secondary studies, Jean Mandel went on to École Polytechnique in 1927 and later to École des Mines. In 1932 he became a professor at École des Mines de Saint-Étienne and in 1948 at École des Mines de Paris. From 1951 to 1973 he was professor of mechanics at École Polytechnique.

Jean Mandel's research career was devoted mainly to the mechanics of solids and the strength of materials. In 1961 he created the Laboratoire de Mécanique des Solides, a laboratory common to École Polytechnique, École des Mines de Paris, École des Ponts et Chaussées and associated to the Centre National de la Recherche Scientifique. In October 1964 he founded and became the first president of the Groupe Français de Rhéologie. In 1980 he became "honorary member" of this group.

The scientific work of Jean Mandel covers a very wide field with a bibliography listing more than 150 articles and 5 books. He presented original ideas on the buckling of beams and shells, the finite deformations of solids, laminar flow in porous media, the bearing capacity of shallow foundations, the punch resistance of a two-layer medium, the stability of underground cavities, the plastic flow of metals, and the effect of cyclic loading on structures, as well as contributions to the fields of thermodynamics, rolling friction and homogenization.

But Jean Mandel's influence extended far beyond the field of his personal research. A good many students were trained, under his direction, in the Laboratoire de Mécanique des Solides. A fine teacher and a constant stimulus to his research group, he gave his time generously to study the details of manuscripts that were sent to him and to suggest the minor modifications he deemed necessary. Those who had the privilege of working with him were left with an impression of palpable scientific passion and moral rigor that will continue to be an example for generations to come.

Jean Mandel passed away on the 19th of July 1982, the victim of a tragic accident at the very height of his intellectual prime.

Text by Pierre Habib

The Jean Mandel Symposium is open to all students, researchers and scientists interested in the proposed topic. It combines, in an informal setting, a keynote presentation by an internationally renowned scientist and talks given by young researchers associated with the laboratory. A large amount of time is dedicated to scientific discussions.