

IMS Public Lecture

Rattleback Reversals: a Prototype of Chiral Dynamics

Speaker: Keith Moffatt
University of Cambridge, UK

Date: Tuesday, 28 April 2009

Time: 6:30pm – 7:30pm

Venue: Lecture Theatre 33
Block S17, Level 2, Faculty of Science
National University of Singapore
Singapore 119260

About the Speaker

Keith Moffatt is Emeritus Professor of Mathematical Physics and Fellow of Trinity College at the University of Cambridge. His speciality is fluid mechanics and its applications in astrophysics and geophysics, particularly the dynamo theory of generation of planetary and stellar magnetic fields. He is interested in all aspects of theoretical mechanics, and is a past President of the International Union of Theoretical and Applied Mechanics (IUTAM).

Keith served as Director of the Isaac Newton Institute for Mathematical Sciences from 1996 to 2001. Since then, he has served on the Scientific Advisory Board of IMS (NUS), and on the Councils of CISM (Centre Internationale des Sciences Mécaniques, Italy) and of AIMS (African Institute for Mathematical Sciences, Cape Town).

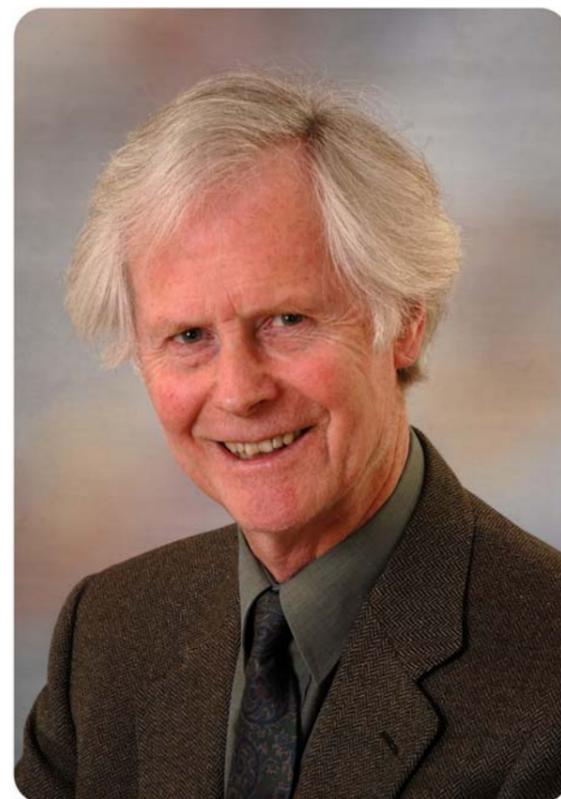
He is a Fellow of the Royal Society, London, a foreign member of the Academies of France, Italy, Netherlands and of the National Academy of Sciences, USA. He also holds honorary doctorates from a number of Universities, including his Alma Mater, Edinburgh University. He has been awarded many prizes including the Hughes Medal of the Royal Society, the Euromech Prize for fluid dynamics, and the Senior Whitehead Prize of the London Mathematical Society.

Abstract

The rattleback is a toy that exhibits a curious and surprising dynamical property: when spun in one direction, it spins quite smoothly before gently coming to rest. When spun in the opposite direction, it reacts violently, and rapidly reverses direction. It will be shown that this is a consequence of its 'chirality', i.e. its lack of mirror symmetry.

Chirality is endemic in nature: for example turbulence in rotating fluid systems is chiral in character, and it is this property that is responsible for the spontaneous generation of magnetic fields in stars and planets. The nature of this fundamental process will be described.

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