

# SEMINARIOS INTERUNIVERSITARIOS MECÁNICA Y MATERIALES

## **Speaker: Professor Rohan Abeyaratne**

Department of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge, MA, USA  
&  
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**Fecha y hora:** 6 de mayo 2009 a las 12:00 h. (café desde 11:30).

**Lugar:** Sala Verde, 1ª Planta, E.T.S.I. Caminos, Canales y Puertos, C/Profesor Aranguren, Univ. Politécnica Madrid, Ciudad Universitaria.

## **Modelling the Motion of Material Interfaces**

This talk will provide an overview of a series of investigations on the motion of a twin or phase boundary beginning at the atomistic scale and leading eventually to the continuum scale. First we will describe a molecular dynamic study of interface motion from which we obtain the relationship between the propagation speed of the interface and the driving force on it, which in this case is the remote shear stress on the specimen. This study also identifies “ledge propagation” as the underlying mechanism by which the interface propagates. Based on this observation from the atomistic study, we next construct and analyze a mathematical model of ledge motion and use it to derive a relationship between ledge propagation and the driving force. The resulting relationship, the “kinetic law”, can be exported to the continuum theory for use there. The kinetic law derived from the model will be compared with the atomistic predictions as well as with various experimental observations. Several other discrete and continuum models of interface motion based on, for example, a nonlinear lattice chain and peridynamic theory, will also be discussed.

### *Breve CV de Rohan Abeyaratne*

Rohan Abeyaratne is the Quentin Berg Professor of Mechanics at MIT and the Director of the Singapore-MIT Alliance for Research and Technology (SMART) - a major new research centre established by MIT and the National Research Foundation of Singapore. He has been the Head of the Department of Mechanical Engineering at MIT from 2001-2008 and holds a MacVicar Fellowship, MIT's highest award for education. Professor Abeyaratne is internationally recognized for his theoretical work in mechanics, particularly, for his work on the dynamics of phase transitions. He has published extensively, including two books, the “Evolution of Phase Transitions” and “The Mechanics of Elastic Solids: Volume 1”. Professor Abeyaratne is a Fellow of ASME and a Fellow of the American Academy of Mechanics. He serves on the editorial boards of different international journals, is a member of the scientific advisory boards for many universities, including the Max Planck Institute for Mathematics in the Sciences, and has recently completed serving a two-year term as President of the American Academy of Mechanics.

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Con la colaboración de: Dpto. Mecánica de los Medios Continuos y T. Estructuras (UPM), Dpto. Ciencia de los Materiales (UPM), Dpto. Mecánica Estructural y Construcciones Industriales (UPM), IMDEA-Materiales, Dpto. Matemáticas (IMAFF, CSIC).