

IUTAM Symposium on Scaling in Solid Mechanics

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IUTAM Symposium on Scaling in Solid Mechanics

Proceedings of the IUTAM Symposium held
in Cardiff, UK, 25–29 June, 2007

Edited by

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 Springer

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ISBN: 978-1-4020-9032-5

e-ISBN: 978-1-4020-9033-2

DOI 10-1007/978-1-4020-9033-2

Library of Congress Control Number: 2008934762

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Printed on acid-free paper

9 8 7 6 5 4 3 2 1

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Preface

This volume constitutes the Proceedings of the IUTAM Symposium on ‘Scaling in Solid Mechanics’, held in Cardiff from 25th to 29th June 2007. The Symposium was convened to address and place on record topical issues in theoretical, experimental and computational aspects of scaling approaches to solid mechanics and related fields. Scaling is a rapidly expanding area of research having multidisciplinary applications. The expertise represented in the Symposium was accordingly very wide, and many of the world’s greatest authorities in their respective fields participated.

Scaling methods apply wherever there is similarity across many scales or one need to bridge different scales, e.g. the nanoscale and macroscale. The emphasis in the Symposium was upon fundamental issues such as: mathematical foundations of scaling methods based on transformations and connections between multi-scale approaches and transformations. The Symposium remained focussed on fundamental research issues of practical significance. The considered topics included damage accumulation, growth of fatigue cracks, development of patterns of flaws in earth’s core and in ice, abrasiveness of rough surfaces, and so on. The Symposium consisted of forty-two oral presentations. All of the lectures were invited. Full record of the programme appears as an Appendix. Several of the lectures are not represented, mainly because of prior commitments to publish elsewhere. The proceedings provide a reasonable picture of understanding as it exists at present. The Symposium showed that scaling methods cannot be reduced solely to dimensional analysis and fractal approaches. The modern scaling approaches consist of a great diversity of techniques. These proceedings contain lectures on state of the art developments in self-similar solutions; fractal models, models involving interplay between different scales, size effects in fracture of solids and bundles of fibres, scaling in problems of fracture mechanics, nanomechanics, contact mechanics and testing of materials by indentation, scaling issues in mechanics of agglomeration of adhesive particles, and in biomimetic of adhesive contact.

The International Scientific Committee responsible for the Symposium comprised the following:

Professor Feodor M. Borodich (UK) – Chairman
Professor Philippe Davy (France)
Professor Jüri Engelbrecht (Estonia)

Professor Dimitrios Kolymbas (Austria)
Professor Wing Kam Liu (USA)
Professor Hans Muhlhaus (Australia)
Professor Franz-Josef Ulm (USA)
Professor Wei Yang (PR China)

The Committee gratefully acknowledges financial support for the Symposium from the International Union of Theoretical and Applied Mechanics.

The smooth running of the Symposium owes much to the efforts of Cherrie Summers and Kate Osbaldeston, and it would not have happened at all without a great deal of work before, during and after, by Maria del Mar Suarez-Alvarez, to whom particular thanks are due.

Cardiff
June 2008

F. M. Borodich

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