

Preface

Direct methods refer to a class of analysis methods that aim to characterise the limit state of a material or structure when subjected to an increasing or cyclic loading history, without the need to generate the entire response to the history of loading. Direct methods were originally developed for limit state and shakedown analysis for an elastic perfectly plastic material model. Developments in recent years have explored cyclic solutions for more general material models and for optimal design and the characterisation of material behaviour in terms of material microstructure. The resulting methods have been successfully applied to a number of industrially important structural problems, including the design and prediction of life expectancy of structures subjected to complex thermo-mechanical loading; and the behaviour of road pavements subjected to repeated loading. Computational methods of increased efficiency continue to be developed.

The papers in this volume provide a state-of-the-art insight into the subject and have arisen from an International Workshop held at the University of Oxford on 6–8 September 2015. More than 30 delegates from eleven countries attended and represent the foremost researchers in this area. The workshop was the fifth such workshop, following previous biannual workshops in Aachen, Lille, Athens and Reggio Calabria. The papers from the previous workshops have also been published by Springer.

The papers are arranged in the same format as the workshop in which groups of papers, are concerned with similar issues. The papers have all been subjected to a rigorous review procedure before acceptance for publication.

The editors would like to thank all the scientists who attended the workshop and have contributed to the high quality of the papers in this volume. Special thanks go to Amanda Bradbury for her exceptional help in organising the Workshop.

We are also grateful to the editorial staff of Springer for their patience and guidance during the production of this volume.

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