

Preface

Civil and mechanical engineers are to a large extent concerned with safety- and life assessment of structures under thermo-mechanical loading which may cause severe inelastic straining. This task is virtually impossible to perform following cumbersome and time consuming evolutionary methods which, additionally, require the complete knowledge of the loading history. Mostly, however, only variation intervals of the loads are known. Thus, it is important to be able to produce margins of safe service conditions for structures, as well as for structural material, against excessive inelastic deformations.

Methods that aim towards this end, avoiding step-by-step analysis, are called Direct Methods. They are non-evolutionary, and although such methods have existed for some time, they are attracting an increasing interest from scientists and researchers, based on new mathematical formulations and new developments on numerical analysis.

The present volume contains the most recent advances on these methods. It is the outcome of the third international workshop that was held in Athens on February 2012, following the successful first and second workshops in Aachen in 2007 and Lille in 2009. The event, which attracted more than 30 scientists from 6 countries, was organized by the National Technical University of Athens and was hosted by the Onassis Cultural Center.

The papers in the book are arranged in the order of their appearance in the workshop and their contributions are in the fields of Structural and Soil Mechanics as well as Material Science. All the contributed papers have undergone a rigorous review process before acceptance for publication.

We would like to thank all the scientists that have participated in this book for the high quality level of their work.

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