

Editors

Giacomo Viccione
Claudio Guarnaccia



Latest Trends in Engineering Mechanics, Structures, Engineering Geology

**Proceedings of the 7th International Conference on
Engineering Mechanics, Structures, Engineering Geology
(EMESEG '14)**

Salerno, Italy, June 3-5, 2014

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Preface

This year the 7th International Conference on Engineering Mechanics, Structures, Engineering Geology (EMESEG '14) was held in Salerno, Italy, June 3-5, 2014. The conference provided a platform to discuss structural stability analysis, formation and calculation of metal structures, reinforced concrete structures, strength of materials, mechanics of structural materials, theory of plasticity, earthquake-resistant structures, building construction, geotechnical seismic mechanics, applied hydrogeology, environmental engineering geology etc. with participants from all over the world, both from academia and from industry.

Its success is reflected in the papers received, with participants coming from several countries, allowing a real multinational multicultural exchange of experiences and ideas.

The accepted papers of this conference are published in this Book that will be sent to international indexes. They will be also available in the E-Library of the WSEAS. Extended versions of the best papers will be promoted to many Journals for further evaluation.

Conferences such as this can only succeed as a team effort, so the Editors want to thank the International Scientific Committee and the Reviewers for their excellent work in reviewing the papers as well as their invaluable input and advice.

The Editors

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Plenary Lecture 1

A Numerical Method for Nonlinear Analysis of the Structures



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Abstract: Recent decades, an important domain of computer simulation in mechanics is the analysis of structures made from visco-elastic and visco-plastic materials. This is connected with the large number of applications in various fields as aerospace technology, automotive industry and mechanical engineering.

Two types of nonlinearities occur in structural problems. The first type is referred to as geometric analysis, and it appears when the deflections are large enough to cause significant changes in the geometry of the structure, so that the equations of equilibrium must be reformulated for the deformed configuration. The second type is referred to as material nonlinearity and is due to the nonlinearity elastic and plastic or viscoelastic behavior of the structural material.

The present study is intended to provide an algorithm by which we can find the response evaluation of a viscoelastic Euler-Bernoulli beam under quasi-static and dynamic loads for different boundary conditions. The constitutive equation for a rheological model with three parameters relates time-dependent stress to time dependent strain through a differential operator. The numerical formulation is based on a variational method and the techniques of integral transforms. Thus, we avoid the discretization of the temporal interval and so, the errors that occur in the cases when the structures are analyzed by the finite element method. An example proves the accuracy of the solution for a simply-supported beam subjected to a distributed creep load. Theoretical and numerical results can be easily extended to analyze the complex structural configurations.

Brief Biography of the Speaker: Olga Martin graduated the Faculty of Mathematics and Mechanics, University of Bucharest, Romania. She received his PhD in mathematics with the specialization in Dynamic Plasticity with paper work ‘Applications of the Finite Element Method in Dynamic Plasticity’. During of twenty years, she had been senior researcher in Aircraft Institute, Strength Materials Department. Technical experience: structural strength computing reports using ANSYS program (wing-fuselage, fuselage frame, fin, elevator, rudder and aileron), dynamic and static test-programs for aircraft structures, fatigue test-programs for aircraft structures, iterative methods for the study of the reactions, which correspond to movable control surfaces, attached at n – points to an elastic structure and program of this, static and fatigue computation of the propeller (mono-bloc hub, blades and blades retention system).

Nowadays, she is Professor at Applied Sciences Faculty, University “Politehnica” of Bucharest.

Fields of specialization: Mathematical Analysis, Mathematical Physics, Computational and Experimental Solid Mechanics, Plasticity Dynamics, Structural Strength Calculation, Numerical Analysis, Statistical Calculus. She has published over 96 research papers and 18 books.

Member of the editorial boards: Politehnica Sci. Bull. Series A, WSEAS Transactions on Applied and Theoretical Mechanics and she was involved in the program/organizing committees for many international conferences.

Membership of Professional Societies: Society of Computer Aided Engineering – Member National Union of Romanian Scientists (Founding member), Balkan Society of Geometers member, Romanian Society of Mathematicians.

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