EUROPEAN MECHANICS SOCIETY

Generalized and microstructured continua: [new ideas in modeling] and/or [applications to structures with (nearly)inextensible fibers]

EUROMECH-Colloquium 579

3-8 April, 2017, Arpino, Italy

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on
Generalized and microstructured continua: [new ideas in modeling] and/or [applications to structures with (nearly-)inextensible fibers].
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organized by

the CNRS International Associate Laboratory Coss&Vita
Paris Federation of Mechanics Labs and the International Research Center for the Mathematics and Mechanics of Complex Systems
(F2M – M&MoCS)

The Euromech Colloqium is intended to provide a forum for experts in generalised and microstructured continua with inextensible fibers to exchange ideas and get informed about the latest research trends in the domain. Generalized continua with inextensible fibers (GCIF) are today employed in very wide class of applications, from the design of special fabrics to biological tissue engineering. The scientific problems posed by the growing needs of applications involve a very large number of areas, as the theoretical coverage, the designing of suitable experimental procedures and the development of specific numerical tools are all crucial aspects of the general picture. The importance of scientific meetings is therefore felt in this subject with particular intensity. The proposed topic lies in the framework of generalized continua. While being particularly suitable to model (almost all) natural materials, classical continuum models have poor prediction power when advanced architectured materials are concerned. In the recent past, indeed, the development of new technical manufacturing possibilities has pushed for a great (but still not sufficient) development of generalized continua. The key challenge, today, is not only to be able to predict the behavior of already existing advanced materials, but also to succeed in the right constitutive characteristics at the micro-scale in order to get a certain behavior at the macro- scale. It is easily understandable, then, that the investigation of GCIF requires a high degree of competence in functional analysis, in particular concerning homogenization techniques, as a proper micro-macro identification is of course of great importance in order to develop suitable continuous models which are at the same time rich enough to allow an accurate description of the real objects and simple enough to be concretely useful. Among the objectives of the Colloquium, finally, there surely will be the promotion of researches which are at the moment motivated by the problems set in the given context, but that may entail a much more general scope, thus originating new independent lines of investigation. This is indeed, in our opinion, one of the highest tasks of scientific workshops.

Main Topics:

1) Phenomenology of materials reinforced with nearly inextensible fibers.
2) General concept for microstructured continuum modeling.
3) Micro-macro homogenization techniques and constitutive law identification.
4) Strain and stress localization phenomena.
5) Dynamic behavior of continua with inextensible fibers.
6) Effects on acoustic properties of nearly inextensible reinforcements.
7) Applications to mechanics of living tissue, engineering fabrics and composite reinforcements.
8) Damage and fracture in generalized continua with inextensible fibers.

Main goals:

1) To find the correct micro-macro identification procedure allowing for the characterization of suitable macro-models for continua with inextensible fibers.
2) To determine the characteristics of fibers and constraints in order to obtain the desired macroscopic behavior.
3) To identify new mathematical problems and numerical methods useful for the conceived applications and new independent research lines.
4) To contribute to the establishment of suitable experimental protocols for continua with inextensible fibers.
5) To find the most interesting technological and engineering applications for continua with inextensible fibers.

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Location: the EUROMECH-Colloquium 579 will be held in Arpino, a picturesque ancient city about half way between Napoli and Roma

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