

EUROMECH Colloquium 579

“Generalized and microstructured continua: new ideas in modelling and/or applications to structures with (nearly-) inextensible fibres”

3 – 8 April, 2017, Arpino, Italy

Chairperson: Francesco dell’Isola

Co-Chairpersons: Philippe Boisse

The main purpose of Colloquium 579 was to provide a forum for experts in generalized and microstructured continua with inextensible fibres to exchange ideas and get informed about the latest research trends in the domain. Generalized continua with inextensible fibres (GCIF) are today employed in a very wide class of applications, ranging from the design of special fabrics to biological tissue engineering. The scientific problems posed by the growing needs of these kinds of application involve a very large number of areas, as the theoretical coverage, the design of suitable experimental procedures and the development of specific numerical tools are all crucial aspects of the general picture. The proposed topic lies in the framework of generalized continua. Although classical continuum models can be used to model almost all natural materials, they have poor predictive power when advanced architecture materials are considered. Recently, new manufacturing possibilities have created a need for improved understanding of generalized continua.

EUROMECH Colloquium 579 was a great success in terms of participation and quality of featured presentation and discussions. There were altogether about 63 participants from 15 countries, including 3 keynote lecturers: Philippe Boisse, INSA De Lyon, France; J-F Ganghoffer, Université de Lorraine, France; Francesco dell’isola, Università degli Studi di Roma, La Sapienza, Italy.

The infrastructure of a small town like Arpino encouraged discussions and exchanges during the week of the colloquium, even outside the official schedule, and most of all during lunch breaks and social events.

The main key points discussed were the following:

- Phenomenology of materials reinforced with nearly inextensible fibres;
- General concept for microstructured continuum modelling;
- Micro-macro homogenization techniques and constitutive law identification;
- Strain and stress localization phenomena;
- Dynamic behavior of continua with inextensible fibres;
- Effects on acoustic properties of nearly inextensible reinforcements;
- Applications to mechanics of living tissue, engineering fabrics and composite reinforcements.

The key challenge today is not only to be able to predict the behaviour of already existing advanced materials, but also to succeed in prescribing constitutive characteristics at the micro-scale that will lead to desired behaviour at the macro-scale.

Several of the topics addressed are still very open, and the discussions provided a good push in what the organizers believe is the right direction for their solution and complete understanding. Numerous papers and preprints stemmed from the discussions and debates at Colloquium 579, demonstrating that the meeting has been successful in terms of scientific exchange and production. The community plan to regularize this event to a yearly basis.