

Foreword: Mechanical behaviour of cellular solids

On June 7–10, 2004, the EUROMECH Colloquium 459 ‘Mechanical behaviour of cellular solids’ was held in Nancy, France, on the Campus of the *Institut National Polytechnique de Lorraine* (INPL). It brought together 42 scientists from 9 European countries and the US, and focussed on the current state of the art in the growing field of cellular and fibrous materials.

Cellular solids and fibrous materials have fostered an increasing number of research activities and technological developments in the last decade. Metal foams, for instance, are emerging as a new class of engineering materials, to be used as energy absorbers in packaging and in vehicles, while their low density makes them attractive as core material for structural sandwich panels. Fibrous or fiber-reinforced materials, including woven and knitted structures, are attractive because of their low weight, their ease of fabrication, their good in-plane properties and ability to undergo large out-of-plane shape changes.

Cellular solids and fibrous materials have in common that they inherit their good (thermo)mechanical properties directly from their network-like microstructure. The overall behaviour depends on:

- (i) The properties of the constituting solid
- (ii) The porosity
- (iii) 3D morphological information of the network architecture.

As a result, the mechanical properties of cellular solids and fibrous materials are governed by the same scaling relations and involve similar modelling strategies.

This Special Issue contains a representative selection of papers presented at the Colloquium, grouped in four different chapters:

(A) Processing and experimental investigation (Papers by Salimon *et al.*, Benouali *et al.*, Amsterdam *et al.*, Onck *et al.*, Viot *et al.*).

(B) Overall properties and homogenization (Papers by Demiray *et al.*, Mills, Grenestedt, Luxner *et al.*, Babin *et al.*, Bikard *et al.*, Florence *et al.*).

(C) Scale effects and generalised continuum models (Papers by Zurob and Bréchet, Forest *et al.*, Tekoglu and Onck, Diebels *et al.*).

(D) Woven and fibrous materials (Papers by Ben Boubaker *et al.*, Böhl and Reese, Durville, Bergonnier *et al.*, Boisse *et al.*, Poquillon *et al.*).

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