SEMINARIOS INTERUNIVERSITARIOS MECÁNICA Y MATERIALES

Speaker: Professor Stelios Kyriakides
The University of Texas at Austin, Texas, USA
USA Engineering Academy Member,
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Lugar: Sala Verde, 1ª Planta, E.T.S.I. Caminos, Canales y Puertos, C/Profesor Aranguren, Univ. Politécnica Madrid, Ciudad Universitaria.

On the crushing of open-cell foams

Synthetic cellular materials such as open-cell foams have a complex microstructure consisting of an interconnected network of cells resulting from the foaming process through which they are usually made. The cells are irregular polyhedra with anywhere from 9 to 17 faces. The material is concentrated in the nearly straight edges of the polyhedra and at the nodes where they intersect, usually four at a time. This lecture is concerned with the understanding and modeling of the compressive response of open cell polymeric and metal foams. For both classes of materials the response starts with a nearly linear elastic regime that terminates into a limit load followed by an extensive load plateau. Results from polyester urethane and Al-6061-T6 open cell foams with relative densities of about 0.02 and 0.08 respectively are used to illustrate this behavior using experiments coupled with several levels of modeling. The experiments include characterization of the microstructure using micro-computed X-ray tomography, measurement of the properties of the base material, and measurement of the compressive response of foams of various cell sizes. A sequence of models for predicting the complete response of such foams has been developed.

Brief CV of Stelios Kyriakides

Stelios Kyriakides is Professor at the Department of Aerospace Engineering & Engineering Mechanics at UT-Austin and Director of the Research Center for Mechanics of Solids, Structures & Materials at that University. He is recognized for his theoretical and experimental contributions to the areas of materials science and mechanical engineering and more in particular for his contributions to the analysis of instabilities in solids. He has been elected fellow of the American Academy of Mechanics and Fellow of American Society of Mechanical Engineers.

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