

## Editorial

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Intensification of manufacturing processes and expansion of usability envelopes of modern components and structures in many cases result in dynamic loading regimes that cannot be presented adequately employing quasi-static formulations of respective problems of solid mechanics. Specific features of dynamic deformation, damage and fracture processes are linked to various factors, most important among them being: a transient character of load application; complex scenarios of propagation, attenuation and reflection of stress waves in real materials, components and structures; strain-rate sensitivity of materials properties; various thermo-mechanical regimes. All these factors make both experimental characterisation and theoretical (analytical and numerical) analysis of dynamic deformation and fracture rather challenging; for instance, besides dealing with a spatial realisation of these processes, their evolution with time should be also accounted for.

To meet these challenges, an International Symposium on Dynamic Deformation and Fracture of Advanced Materials D2FAM 2013 was held on 9–11 September 2013 in Loughborough, UK. Its aim was to bring together specialists in mechanics of materials, applied mathematics, physics, continuum mechanics, materials science as well as various areas of engineering to discuss advances in experimental and theoretical analysis, and numerical simulations of dynamic mechanical phenomena. Some 50 papers presented at the Symposium by researchers from 12 countries covered various topics including: high-strain-rate loading and deformation; dynamic fracture; impact and blast loading; high-speed penetration; impact fatigue; damping properties of advanced materials; thermomechanics of dynamic loading; stress waves in micro-structured materials; simulation of failure mechanisms and damage accumulation; processes in materials under dynamic loading; a response of components and structures to harsh environment. The materials discussed at D2FAM 2013 ranged from traditional ones such as metals, alloys, polymers and composites to advanced and emerging materials, such as foams, cellular materials and metallic glasses, as well as bio-materials.

Within the framework of the Symposium, a Special Session “Parametric Resonance, Vibro-impact and Related Phenomena” was organised by partners of the FP7 IAPP project PARM-2: “Vibro-impact machines based on parametric resonance: Concepts, mathematical modelling, experimental verification and implementation.” The Session focused on the topics, directly related to the project: excitation, stabilization, control and applications of parametric resonance (PR); multiple degrees of freedom of PR-excited systems; basic principles of PR-based macro and micro tools; design and technological aspects of PR-based machines; vibro-assisted machining; fatigue under high-amplitude vibro-impact conditions



and corresponding optimal design; localisation near defects in dynamic response of elastic lattices and structures; dispersive waves and dynamic fracture in non-uniform lattice systems; thermally induced surface-breaking cracks, etc.

This issue presents a selection of research papers presented at the International Symposium on Dynamic Deformation and Fracture of Advanced Materials D2FAM 2013. The Symposium Organisers would like to acknowledge its sponsors: Institute of Physics, International Centre of Vibro-Impact Systems and Marie Curie Action: Industry-Academia Partnerships and Pathways of the Seventh Framework Programme (FP7) of the European Commission (PARM-2 consortium). The PARM-2 consortium sponsored twenty scholarships for early-stage researchers to participate in this Symposium.