Mechanical Response Modelling of Different Porous Metal Materials

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Porous metals have been increasingly used in modern engineering applications over the past decades due to their multi-functionality and attractive combination of mechanical and thermal properties [1]. The understanding of their mechanical behaviour is of crucial importance for their use in engineering applications. The presentation focuses on geometrical and mechanical analysis of three very different porous materials (Figure): Advanced Pore Morphology (APM) foam [2, 3], open-cell aluminium foam [4, 5] and Metallic Hollow Sphere Structure (MHSS) [6]. The geometrical analysis is based on proper recognition of their internal porous structure reconstructed from micro computed tomography scans, taking into account the statistical distribution of geometrical parameters. The results of conducted geometrical analysis provided means for methodology development for representative 2D and 3D geometrical modelling of irregular porous structures and consequent formation of parametric computational models. These were then used to study the mechanical behaviour of analysed porous structures by means of advanced quasi-static and dynamic nonlinear computational simulations using the LS-DYNA code. Computational results were compared and validated by experimental testing programme.

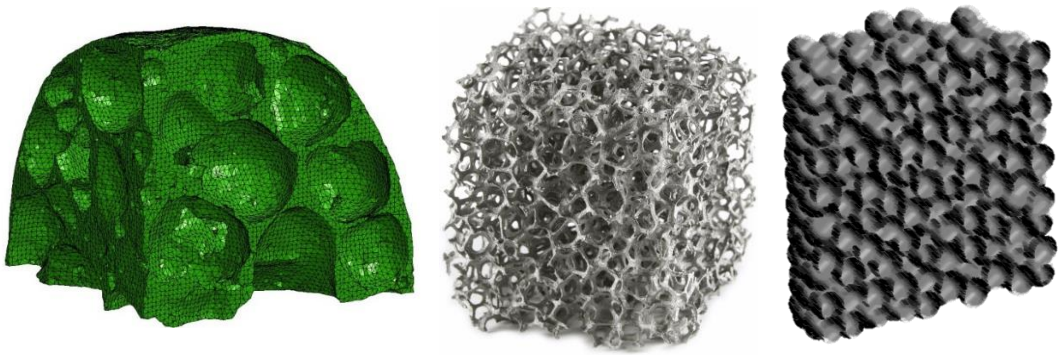

Figure: APM foam element, open-cell foam and MHSS.

Literature

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