A CELLULAR POROUS STRUCTURE MODELLING AND ITS UNIAXIAL TENSILE TESTING

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Modern technologies enable us to produce much more sophisticated components of industrial applications. It requires the designers to change their thinking at product design. Recent advances in additive technologies brought also the possibilities to make the lightened parts, thanks to so-called cellular structure in their core. When the structure is regular, the mechanical properties of the part can be controlled and the specific type of the cellular structure can be used in a specific product when the mechanical properties and behaviour of this cellular structure in real conditions are known. The article deals with the triply periodic helical structure of minimal surfaces produced by the additive approach and its mechanical properties. One of the complex porous structures created based on the minimal surfaces along with the approaches that can be used for the structure modelling is described in the paper. In the last part of the article, the experimental study of this structure and the achieved results are described. Maraging steel MS1 was selected as the material for structures production using Direct Metal Laser Sintering (DMLS) technology. The results have shown that the unit of a triply periodic helical structure with a lower volume ratio is able to carry a greater relative load to failure then the unit of the structure with higher volume ratio.

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