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Researches Defining the Characteristics of Hyperelastic and Composite Materials with Gas Phase in the Vehicle–Pedestrian System

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Abstract: The aim of this work is to develop methods of describing the properties of materials based on knowledge of: basic materials, technologies (gas pressure formed during foaming) using the theory of hyperplastic materials, in particular using Ogden's model and its modifications. The aim also goes on to analyze the possibility of energy dissipation between a pedestrian and a vehicle on impact. The energy created during the impact will be dissipated by the element of protection made of a hyperdeformable material. The resulting description can be used for the applicability of hyperelstic models, and therefore in the whole range of deformation of the polymer-based composites and elastic composites of metals (excluding plasticity). This thesis further presents analytical methods of hyperelastic materials using Finite Elements Method. Using FEM it is possible to verify used materials, define the materials models and show the effectiveness of the designed component without performing any expensive impact tests. The presented methods and applications of the characteristics of hyper elastic materials and composites with the gas phase are used to determine the proper selection of parameters (material properties), increasing the opportunities for a proper assessment of the effectiveness of safety devices.

Keywords: *energy dissipation; intensive construction; hyperelstic materials; gas phase; gasar; crushable foam.*

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