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Title: Shear and mode II fracture of PUR foams

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Abstract: Polyurethane (PUR) foam materials are widely used as cores in sandwich composites, for packing and cushioning. They are made of interconnected networks of solid struts and cell walls incorporating voids with entrapped gas. The main characteristics of foams are lightweight, high porosity, high crushability, and good energy absorption capacity. Fracture toughness in mixed mode loading is of particular interest because foam cracking weakens the structure's capacity for carrying loads. Present paper assesses the shear elastic (shear modulus) and mechanical (shear strength) properties of polyurethane foams. Also, three different types of specimens were used to determine mode I and mode II fracture toughness. The shear modulus, shear strength and fracture toughness increases with increasing foam density. Also the effect of loading direction and loading speed is investigated. The authors propose a micromechanical model to estimate fracture toughness based on the tensile strength of the solid material and the topology of the cellular structure. (C) 2015 Elsevier Ltd. All rights reserved.

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