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CONSTITUTIVE MODELLING AND EXPERIMENTAL VALIDATION OF AMORPHOUS POLYMERIC BLENDS PC/ABS

Fernando P. B. Macedo[1]*, Abílio M. P. de Jesus[1] and Francisco M. A. Pires[1]

[1] Department of Mechanical Engineering, Faculty of Engineering, University of Porto
Rua Dr. Roberto Frias 400, 4200-465 Porto, Portugal
E-mail: fmacedo@fe.up.pt; ajesus@fe.up.pt; fpires@fe.up.pt

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The growing importance of *engineering polymers* requires the development of new improved materials. The mixture of two or more thermoplastics with the addition of small dispersed rubber particles - the so-called *rubber-toughened polymeric blends* - presents itself as a very good solution for this challenge. A case of interest is the ternary amorphous PC/ABS blends - although neat polycarbonate has high ductility, thermal stability and durability, it lacks notch-sensitivity and fracture toughness, properties that are highly improved by the addition of ABS, a rubber-toughened polymer [1].

The fracture behaviour of rubber-toughened polymers is known to be governed by *matrix shear yielding* and *crazing*, interconnected with *cavitation* of the rubber particles, and depends on the applied stress state. In compression, these polymers usually show plastic deformation by shear-yielding; in tension, a competition between shear-yielding and crazing takes place. Crazing often appears in sharp notches and is associated with being the outcome of internal cavitation [2].

This work presents the results of the experimental characterisation and constitutive modelling of the PC/ABS blend under different stress states and for various compositions, analysing the deformation mechanisms existing during the mechanical response. The benchmark experimental results ensure the attainment of the material properties through a specialized parameter identification procedure. The constitutive model, based on the work of Ames [3] and in the Gearing-Anand model [2], is implemented through an implicit integration scheme. A representative set of numerical examples is presented taking into account a wide range of mechanical conditions and is appraised against the experimental set of results obtained by our group.

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