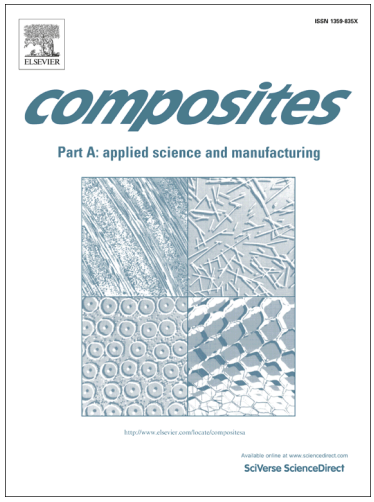

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VALIDATION OF THE MODIFIED RULE OF MIXTURES USING A COMBINATION OF FIBRE ORIENTATION AND FIBRE LENGTH MEASUREMENTS

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Abstract

The goal of this study was to investigate the fibre orientation distribution (FOD), and subsequent mechanical properties, of an injection moulded plate with two different number averaged fibre lengths, termed in this paper medium (1.35mm) and long (2.40mm). Fibre orientation measurements (FOD) were made using the 2D elliptical section method and an in-house developed image analyser. The samples were injected from a pin gate located at the centre and top of the plate. Expansion flow on the divergent flow front from this pin gate resulted in a core region with circumferential alignment, while through thickness shear resulted in the usual realignment of fibres in the flow direction either side of the core, termed the shell layers. Two interesting aspects were discovered from these measurements. First, and most importantly, the FOD was found to be independent of the two fibre lengths in this study, and so predominantly controlled by the mould shape and the interaction with the flow front. Second, the fibres in the core region were found to be much closer packed than those in the shell regions.