

Experimental study of fibre washout induced by high injection pressure during resin transfer moulding

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Abstract

Fibre washout during high-pressure resin injection is an unwanted emergent defect. In previous study [1], the authors developed one-dimensional stress model for fibre washout, which predicts the influence of the high injection pressure resin transfer moulding (HIPRTM) variables such as clamping force and injection pressure on the distance to which fibre washout is observed (fibre washout distance). This mesoscale model of fibre washout effects during HIPRTM with thermoset resin requires the knowledge of coefficients of friction between dry and wet textile reinforcement layers and the mould. To measure these coefficients, we develop an experimental procedure. During HIPRTM process, dry textile fabrics are compacted so that the preform reaches a desired thicknesses. Therefore, the normal (compressive) stress applied to the fibrous medium can be relaxed before injection. In agreement with the specifications of HIPRTM, the coefficients of friction between fabric layers and the mould are measured on the relaxed mode of the preform at the desired thickness. Therefore, a first set of compressibility tests under relaxation are done to measure the normal stress applied to the preform at given thicknesses. Then, this relaxation is used again in the measurement of the coefficients of friction. Subsequently, a second set of experiments is performed to measure Coulomb

friction during the pulling of fabric stack positioned between two metallic parts. Finally, the coefficients friction of dry and wet fabric are measured. The experiments are done on a 2 by 2 twill carbon fabric. According to these sets of experiments, one can expect that fibre washout slip will preferentially occur at the preform/mould interface, because, the coefficient of friction of ply/ply is usually higher than ply/mould [2].

References

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