

A SENSITIVITY ANALYSIS OF A DISCRETE APPROACH TO MODEL THE THERMOPLASTIC COMPOSITE MATERIAL AT FORMING TEMPERATURE

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The hot-forming process for thermoplastic composites is a very promising fabrication route for high volume applications. Reliable and fast numerical tools are needed to optimise the forming process and to support industrial exploitation. In this work a discrete model is proposed to simulate the behaviour of composite material with thermoplastic matrix into the framework of the hot-forming process. This model uses beam and shell elements to model the behaviour of the composite at the forming temperature. Basically, the beam elements simulate the behaviour of the fibres while the shell elements model the deformation of the resin material. The capacities of the model are illustrated with classical benchmarks (e.g. bias extension tests and bending tests). A numerical sensitivity analysis is conducted to identify the most important mechanical parameters which affect the deformation of the structure.