

Tricot Stitching Modeling of Non Crimp Fabric in Forming Simulation

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Abstract. The use of Non Crimp Fabric composite has increased during the last years due to cheaper cost of manufacturing and high mechanicals properties suitable for applications such as aeronautic, automotive and wind turbines. The main difference between Non Crimp Fabric (NCF) and textile reinforcement is the mean of manufacturing: where in textile fibers are woven, in NCF layers of unidirectional oriented fibers are assembled with a stitch. As a consequence, the stitch especially its geometry (the stitch pattern) will have a major influence on the deformation of this type of reinforcement during forming process¹. Experimental campaign on NCF samples compared to textile with the same fibers orientation have showed that the stitching affect the shear behavior of the reinforcement^{2, 3} which is one of the main mode of deformation in the forming process. A method to consider the influence of the tricot stitching in the shear behavior depending on its manufacturing parameters has been developed. This specific behavior has been integrated in a semi discrete element⁵ to simulate the forming process. The results from simulation of shear tests showed a good accordance with the experiments for the tested reinforcements.

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