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FLUID FLOW MODELING OF RESIN TRANSFER MOLDING FOR COMPOSITE MATERIAL WIND TURBINE BLADE STRUCTURES

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ABSTRACT

Resin transfer molding (RTM) is a closed mold process for making composite materials. It has the potential to produce parts more cost effectively than hand lay-up or other methods. However, fluid flow tends to be unpredictable and parts the size of a wind turbine blade are difficult to engineer without some predictive method for resin flow.

There were five goals of this study. The first was to determine permeabilities for three fabrics commonly used for RTM over a useful range of fiber volume fractions. Next, relations to estimate permeabilities in mixed fabric lay-ups were evaluated. Flow in blade substructures was analyzed and compared to predictions. Flow in a full-scale blade was predicted and substructure results were used to validate the accuracy of a full-scale blade prediction.