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A New Process Control Method for Microwave Curing of Carbon Fibre Reinforced Composites in Aerospace Applications

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Abstract: For the fabrication of carbon fibre reinforced composites used in aerospace industry, microwave curing technologies are more effective than traditional thermal curing technologies. However, the manufacturer's recommended cure cycles used in traditional autoclave curing are directly adopted into current microwave curing technologies without thorough validation. Here, a new cyclic heating and cooling methodology for microwave curing process control of composite is proposed by analyzing mechanisms of heat conduction, stress generation and curing kinetics. The results of the experiment carried out show significant reductions in residual strain, warpage, total curing time and energy consumption, compared with both traditional thermal curing and current microwave curing technologies. The mechanical properties of samples cured by the new process are compared with the autoclave cured ones.

Keywords: A. Polymer-matrix composites (PMCs); B. Residual stress; B. Strength; E. Cure.

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