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Heat transfer optimization and experimental validation of anti-icing component for helicopter rotor

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Abstract: Heat transfer in anti-icing component for helicopter rotor is optimized considering the wire pattern and heat transfer parameters of the anti-icing component. A heat transfer experiment involving anti-icing component is proposed to validate simulation results. Given the heat transfer and anti-icing efficiency of rotor, multiple parameters affecting heat transfer are selected, and the rotor composite material anti-icing component is numerically optimized. A heat transfer experiment is designed considering the influence of outflow. The experiment is performed to verify the validity of the heat transfer mathematic model of anti-icing component and optimize the heat transfer structure of anti-icing component. After optimizing the heat transfer of anti-icing component, the temperature field distribution on the iron surface of rotor satisfies the anti-icing target aim value as revealed by numerical calculation. Thus, the optimized heat transfer structure of the rotor composite material anti-icing component is effectively obtained. Simulation results verify the effectiveness of the optimized anti-icing component.

Keywords: Heat transfer analysis; Anti-icing; Structure optimization; Wire pattern;

Heat transfer experiment

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