

Numerical and Fundamental Study on Ice Growth of Ice Crystal Accretion

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Ice crystal accretion has been found to be serious phenomenon for engine inner icing. There is a hypothesis that ice crystal accretion occurs mainly when the engine ingests ice particles. In addition to ice particles, super-cooled water droplets and mixture of ice particles and super-cooled water droplets have been advanced ice crystal accretion. These three scenarios are given but the mechanism itself is not clarified. It occurs in the environment where the ambient static temperature is about 30 degree C, but the current icing model is not available to upper the freezing point. In this study, as a basic study of ice crystal accretion, a new icing model is developed which is applicable to the environment where the flow static temperature is above the freezing point. We simulate ice crystal accretion phenomenon and compute super-cooled water droplet impingements on an alminum flat plate which has a high thermal activity.

Keywords: Multi-physics CFD, Engine inner icing, Ice crystal accretion, Super-cooled water droplet