RAL SEMINAR SERIES

Icing Unusual Roughness & Airflow:

Refining Particle Tracking Velocimetry Methods and Evaluating use of Sand-grain Roughness Correlations in Icing

RYAN BOLDT

Postdoctoral Research Associate, Baylor University

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HYBRID MEETING FL2-1001 | Watch Live

As an air vehicle or wind tunnel model is exposed to a supercooled cloud at aircraft speeds, the local convection from the ice, wing, or air vehicle surface to the freestream determines the rate of accretion of ice on the surface. Consequently, predicting the magnitude and convective enhancement of roughness that forms on ice accretion surfaces during flight are critical aspects of ice accretion prediction codes. These codes typically employ an equivalent sand-grain roughness model embedded in either the ice accretion thermodynamics solver or in the flow solver to predict the convective enhancement. However, determining the appropriate value of equivalent sand-grain roughness for an ice accretion surface is non-trivial. Most roughness models have focused on predicting basic statistical features of the ice roughness.

For this study, a Matlab script was developed to characterize the ice accretion roughness for use with the sand-grain roughness correlations of Sigal and Danberg (1990), Bons (2005), Flack and Schults (2010), and Forooghi et al. (2018) using the triangulated surface representations (*.stl files) generated using modern ice accretion metrology approaches. Observations were made about the predicted equivalent sand-grain roughness variations and about the differences between the equivalent sand-grain roughness models. Event Website