Abstract Submitted
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The Effect of Large Scale Freestream Turbulence on Heat Transfer in Stagnating Flow[1] ANDREW GIFFORD, JERROD EWING, T.E. DILLER, PAVLOS VLACHOS, Virginia Tech — Water tunnel experiments have been performed to investigate a general mechanistic model [1] for heat transfer augmentation by large scale freestream turbulence at a stagnation point. Time-resolved Digital Particle Image Velocimetry was used to measure velocity fields and calculate both integral length scale and turbulence intensity in the vicinity of the stagnation point. Time resolved surface heat flux measurements were made simultaneously using a novel thin film heat flux sensor fabricated and calibrated in-house. Varying levels of freestream turbulence were generated using grids at several positions upstream of the stagnation test apparatus. Laminar and turbulent experiments were conducted at Reynolds numbers of 4762, 9525, and 14287 based on the bar width of the turbulence grid. Experimental results for the heat transfer coefficient agree well with results from the general model using only experimental turbulence characteristics.

[1] Nix, A.C. "Experiments on the Physical Mechanism of Heat Transfer Augmentation by Freestream Turbulence at a Cylinder Stagnation Point" Proceedings of GT2005 ASME Turbo Expo 2005. GT-2005-68616. June 6-9, 2005

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