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Surface Cooling Effects of a Counter Rotating Vortex Pair Induced by Vortex Generators[1] JORGE ALVARADO, Texas AM University, JEONGMOON PARK, Mount Vernon Nazarene University, LEONARDO CHAMORRO, University of Illinois at Urbana-Champaign, SCOTT LUX, CHARLES MARSH, U.S. Army Construction Engineering Research Laboratory (CERL) — An experimental investigation was carried out to study the effects of trapezoidal vortex generators (VGs) on air flow and the corresponding surface heat transfer at a Reynolds number of 4800. The flow induced by VGs was characterized using particle image velocimetry (PIV), while infrared (IR) thermography was used simultaneously to determine surface temperature. Measurements were performed in the near-wake region, where an induced counter-rotating vortex pair (CVP) was dominant. Results revealed that VGs led to enhanced local heat transfer due to the interactions of the induced flow structures with the heated surface. The enhanced heat transfer process occurred in the vicinity of the CVP up to a downwind distance of 1.5 VG height. This phenomenon was associated to the accelerated flow in the streamwise direction induced by the CVP. Furthermore, the role of geometric factors such as inclination angle, taper angle, and spanwise spacing of VGs had a direct effect on the induced flow structures and the resulting surface heat transfer enhancement.

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Jorge Alvarado
Texas A
M University

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