

Abstract Submitted
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The thermal and hydrodynamic structure of a turbulent buoyant jet on clean and contaminated free-surfaces K. PETER JUDD, IVAN SAVE-LYEV, GEOFFREY SMITH, NRL — The thermal and hydrodynamic structure of a turbulent buoyant jet impinging normal to clean and contaminated free-surfaces was examined experimentally for fixed jet depth, reduced gravity and several Reynolds numbers. The objective of this investigation is to describe the resulting interaction and morphology of the surface thermal structures. Fluid for the jet is supplied from a gravity feed whose ambient temperature is several degrees above the receiving fluid of a large water basin. Thus the warmer fluid serves as a passive marker. The spatial and temporal characteristics of the surface thermal field were mapped using a mid-wave infrared imager sensitive to radiation in the 3-5 micron band and with an NEDT of 25 mK. As the Reynolds number and/or the degree of contamination are changed, noticeable structural changes were observed in the thermal field around the core and the outer turbulent/non-turbulent regions. Additionally, the subsurface jet was simultaneously interrogated using DPIV and the surface thermal structures are discussed in light of the resulting characteristics of the flow field.

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