

Abstract Submitted  
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**Improvements upon Characterizing the Thermal Boundary Layer in Turbulent, Transcritical Channel Flows**<sup>1</sup> JACK GUO, Stanford University, XIANG YANG, Pennsylvania State University, MATTHIAS IHME, Stanford University — Recent studies have attempted to characterize the thermal boundary layer profile in flows with strong fluctuations in the thermodynamic transport variables. However, the successes of these collapses have been inconclusive. Failure in modelling has been observed especially in the regime of strong heat transfer and large ratios in thermodynamic variables – conditions relevant to turbulent flows at transcritical conditions. We present DNS results and analysis for a series of turbulent channel flows at transcritical conditions, with mean density ratio approaching  $O(20)$ . Through analysis of statistical results, we show that transformations and relations from the extensive literature of compressible flows cannot be directly applied without significant error. To this end, we propose recommendations and improvements toward more accurate characterization of the thermal boundary layer.

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