

Abstract Submitted  
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**A Test of the Validity of Inviscid Wall-Modeled LES<sup>1</sup>** ANDREW REDMAN, KYLE CRAFT, KURT AIKENS, Houghton College — Computational expense is one of the main deterrents to more widespread use of large eddy simulations (LES). As such, it is important to reduce computational costs whenever possible. In this vein, it may be reasonable to assume that high Reynolds number flows with turbulent boundary layers are inviscid when using a wall model. This assumption relies on the grid being too coarse to resolve either the viscous length scales in the outer flow or those near walls. We are not aware of other studies that have suggested or examined the validity of this approach. The inviscid wall-modeled LES assumption is tested here for supersonic flow over a flat plate on three different grids. Inviscid and viscous results are compared to those of another wall-modeled LES as well as experimental data – the results appear promising. Furthermore, the inviscid assumption reduces simulation costs by about 25% and 39% for supersonic and subsonic flows, respectively, with the current LES application.<sup>2</sup> Recommendations are presented as are future areas of research.

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<sup>2</sup>K. M. Aikens, “High-fidelity large eddy simulation for supersonic jet noise prediction,” Ph.D. thesis, Purdue University, 2014.

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