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Busemann-Sears-Haack hybrid geometries applied toward supersonic vehicles for improved wave drag performance ANDREW SKLAR, ZVI RUSAK, Rensselaer Polytechnic Institute — We present a new configuration for supersonic aircraft fuselages. It is first demonstrated that the commercial Fluent code provides mesh converged, valid results for inviscid supersonic flows around various configurations compared to classical predictions. Then, by adapting a hybrid geometry of the Busemann biplane shape to a span-wise split Sears-Haack body in the region between the bodies, we present a physically feasible two-body configuration that reduces shock wave interference between the two bodies and lowers the wave drag per volume of a given fuselage volume and length. The reduction is about 50% when compared to the Sears-Haack body with same volume and length. In addition, when applied to non-enclosed geometries, the Busemann biplane experiences none of the wave drag spikes and hysteresis that were found with biplanes in prior studies, while maintaining its efficacy. Preliminary studies into effects of viscosity for supersonic flows at high Reynolds numbers show that the total drag is limited to 25% greater than inviscid flow results. This effect has also been extended to a triple body configuration, which further cuts the drag per volume to less than 40% of the equivalent Sears-Haack body.

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