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Aerodynamics Simulations for the D8 "Double Bubble" Aircraft Using the LAVA Unstructured Solver[1] SEAN BALLINGER, Columbia University School of Engineering and Applied Science — The D8 "double bubble" is a proposed design for quieter and more efficient domestic passenger aircraft of the Boeing 737 class. It features boundary layer-ingesting engines located under a non-load-bearing π-tail and a lightweight low-sweep wing for flight around Mach 0.7. The D8's wide lifting body is expected to supply 15% of its total lift, while a Boeing 737's fuselage contributes only 8%. The tapering rear of the fuselage is also predicted to experience a negative moment resulting in positive pitch, produce a thicker boundary layer for ingestion by distortion-tolerant engines, and act as a noise shield. To investigate these predictions, unstructured grids generated over a fine surface triangulation using Star-CCM+ are used to model the unpowered D8 with flow conditions mimicking those in the MIT Wright brothers wind tunnel at angles of attack from -2 to 14 degrees. LAVA, the recently developed Launch Ascent and Vehicle Aerodynamics solver, is used to carry out simulations on an unstructured grid. The results are compared to wind tunnel data, and to data from structured grid simulations using the LAVA, Overflow, and Cart3D solvers.

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