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**Spectral element simulations of unsteady flow over a 3D, low aspect-ratio semi-circular wing** SRIHARSHA KANDALA, DIETMAR REMPFER, IIT, Chicago — Numerical simulations of unsteady 3D flow over a low-aspect- ratio semi-circular wing are performed using a spectral element method. Specsolve, a parallel spectral element solver currently under development at IIT, is used for the simulation. The solution is represented locally as a tensor product of Legendre polynomials and $C^0$-continuity is enforced between adjacent domains. A BDF/EXT scheme is used for temporal integration. The fractional step method is used for computing velocity and pressure. The code incorporates a FDM (fast diagonalization method) based overlapping Schwarz preconditioner for the consistent Poisson operator and an algebraic multigrid based coarse grid solver (P.F. Fischer et al, J. Phys.: Conf. Ser.(125) 012076, 2008) for pressure. The simulation replicates the conditions of the active flow control experiment (D. Williams et al, AIAA paper, 2010-4969). The Reynolds number based on chord length and free-stream velocity is about 68000. Different angles of attack, encompassing both pre-stall and post-stall regimes, are considered. These results are compared with data from the experiment and numerical simulations based on Lattice Boltzmann method (G. Brès et al, AIAA paper, 2010-4713).

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