Abstract Submitted
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**Wall-models for immersed-boundary methods**[1] ANTONIO POSA, Politecnico di Bari, ELIAS BALARAS, The George Washington University — Immersed boundary (IB) methods, where the requirement for the computational grid to conform to solid boundaries is relaxed, have been widely used in a variety of applications. In the majority of cases IB methods are usually coupled to Cartesian solvers, and tackle low to moderate Reynolds number problems. Applications at high Reynolds numbers are prohibitively expensive since an increase in the wall-normal resolution can only be achieved by refining the computational grid in all coordinate directions. A solution to this problem is the development of wall-models for IB methods that can compensate for the luck of resolution in both laminar and turbulent regimes. In the present study we propose novel wall treatment based on a two-layer zonal approach, where the solution of a simplified set of equations is solved near the wall for the purpose of providing an accurate estimate of the near wall flow using information form the coarse underlying Navier-Stokes grid. Various models based on different levels approximation will be presented. Results will be shown for canonical cases such as the flow around a smooth cylinder and around a sphere at various Reynolds numbers.

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Elias Balaras
The George Washington University

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