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Adaptive Mesh Refinement for the Immersed Boundary Lattice Green's Function method[1] GIANMARCO MENGALDO, TIM COLONIUS, California Institute of Technology — The immersed boundary lattice Green's function (IBLGF) method, recently developed by Liska and Colonius (JCP, vol. 331, pp. 257-279, 2017), is a recent scalable numerical framework to solve incompressible flows on unbounded domains. It uses an immersed boundary method, based on a 2^{nd}-order mimetic finite volume scheme that is used in conjunction with an adaptive block refinement approach, achieved via lattice Green's functions, whose scope is to limit the computational domain to vortical regions that dominate the flow evolution — e.g. regions in proximity to the immersed body surface and in its wake. The method, as it stands, is competitive for low Reynolds number flows, as the staggered Cartesian mesh employed cannot be stretched or refined locally. In this talk we address this issue by presenting the development of adaptive mesh refinement (AMR) capabilities in the IBLFG method. As we shall see, this new feature and the adaptive block refinement already present in the code help overcoming the limitation of simulating high Reynolds number flows, issue that is endemic to the vast majority of immersed boundary-based methods.

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