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Adaptive finite volume incompressible Navier–Stokes solver for 3D flows with complex immersed boundaries GANESH NATARAJAN, FOTIS SOTIROPOULOS, St. Anthony Falls Laboratory, University of Minnesota — We propose a generalisation of the CURVIB methodology (Ge & Sotiropoulos, JCP 2007) for the solution of the unsteady incompressible Navier–Stokes equations on arbitrary polygonal meshes in domains containing arbitrarily complex, moving immersed bodies. The new finite volume flow solver employs the hybrid staggered/non–staggered approach of Ge & Sotiropoulos (2007) in conjunction with generalised and robust discretisation procedures, so that it can be readily extended to handle adaptive meshes. The flow solver is combined with an isotropic adaptation strategy that effectively tracks flow features of interest and selectively enhances grid resolution. The resulting generic adaptive finite volume flow solver allows for computationally efficient, high resolution numerical simulations of a wide range of engineering and biological flows at Reynolds numbers much higher than what was possible with the original CURVIB methodology.

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