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A high-order Immersed Boundary method for solving fluid problems on arbitrary smooth domains DAVID STEIN, ROBERT GUY, BECCA THOMASES, University of California, Davis — We present a robust, flexible, and high-order Immersed Boundary method for solving the equations of fluid motion on domains with smooth boundaries using FFT-based spectral methods. The solution to the PDE is coupled with an equation for a smooth extension of the unknown solution; high-order accuracy is a natural consequence of this additional global regularity. The method retains much of the simplicity of the original Immersed Boundary method, and enables the use of simple implicit and implicit/explicit timestepping schemes to be used to solve a wide range of problems. We show results for the Stokes, Navier-Stokes, and Oldroyd-B equations.

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