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A high-order Immersed Boundary method for the simulation of polymeric flow. DAVID STEIN, Simons Foundation, BECCA THOMASES, ROBERT GUY, University of California, Davis — We present a robust, flexible, and high-order Immersed Boundary method for simulating fluid flow, including the Incompressible Navier-Stokes equations and certain models of viscoelastic flow, e.g. the Stokes-Oldroyd-B equations. 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. Low and zero Reynolds number problems are handled efficiently and accurately. We demonstrate pointwise convergence of the polymeric stress for flows in complex domains, in contrast to the standard Immersed Boundary method, which generates large errors in the polymeric stress near to the boundaries.

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