

Abstract Submitted
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On the Motion of an Ellipsoid in a quadratic field CURTIS P. MARTIN, SHIYAN WANG, SANGTAE KIM, Davidson School of Chemical Engineering, Purdue University — In this presentation, we show that the Stokes flow surface tractions on a force-free, torque-free ellipsoid in an ambient quadratic velocity field have a simple relationship to the boundary condition on the ellipsoid of the associated disturbance velocity fields. This is reminiscent of the corresponding results for the surface tractions of an ellipsoid in rigid body motion as articulated by Brenner (1964) and explained by Kim (2015) using the self-adjoint property of the double layer operator in the appropriate metric space. These results provide a basis for the exploration of the spectrum of the double layer operator for the ellipsoid, with a view towards the ultimate construction of the biorthogonal expansion of the double layer operator with eigenvalues and eigenfunctions ordered by the far field decays in inverse powers of the radial distance from the ellipsoid center. The orthonormal properties of eigenfunctions of a self-adjoint operator may then be exploited to provide a new and useful velocity representation for an ellipsoid in Stokes flow.

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