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Discrete Green's function method for estimating undisturbed fluid velocity in particle-laden flows[1] JEREMY HORWITZ, Lawrence Livermore Natl Lab — In recent years, the undisturbed fluid velocity has been identified as a key model quantity in the prediction of two-way coupled particle motion and resulting fluid energetics. A number of recent methods have found promise in estimating the undisturbed fluid velocity primarily in unbounded settings. However, the need for accurate procedures in the context of walls is starting to receive attention. We examine one such procedure based on the method of discrete Green's functions. Formally valid, and exact in the zero Reynolds number limit, we demonstrate in this regime that accurate motion of a particle near a wall can be computed using the present procedure. An issue surrounding the use of this method at finite Reynolds number is addressed by extending the theory to an Oseen-like discrete Green's function. The resulting expression can be derived exactly from the discrete equations. By relating the forms of the Stokes- and Oseen-discrete Green's functions, we propose a more general discrete Green's function formulation applicable outside the low particle Reynolds number regime.

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