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Is the stokeslet model sufficient for finding nutrient uptake of microscopic suspension feeders? ALEXANDER T. LUTTON, RACHEL E. PEPPER, University of Puget Sound — Microscopic sessile suspension feeders are part of many aquatic ecosystems. They are single-celled, vary in size from a few to about 100 microns in length, live attached to substrates, and serve important ecological roles as both food for larger organisms and consumers of bacteria and other small particles. These organisms create currents in order to bring food toward them. Understanding these currents may allow us not only deeper insight into the ecology of aquatic ecosystems, but also may enable innovation in water treatment. Simulations of the feeding currents of these organisms typically use a simple model that places a stokeslet above an infinite plane boundary representing the surface of attachment. This model produces a useful approximation for the flow field of the organism, but may be of limited accuracy when the organism is near the boundary. We create a different model composed of a stokeslet and a potential dipole, which form a sphere. This sphere has a $\sin(\theta)$ tangential velocity boundary condition, accounting for the cell body. Using nutrient flux to the organism as our metric, we investigate the discrepancy between the spherical and stokeslet models in order to determine the efficacy of the stokeslet model as an approximation of single-celled suspension feeders.

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