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Nutrient Transport and Acquisition by Diatom Chains in a Moving Fluid MAGDALENA MUSIELAK, George Washington University — The role of fluid motion in the transport of solutes to and away from cells and aggregates is a fundamental question in biological and chemical oceanography. However, little is known about behavior of phytoplankton cells in well-defined flow fields. Experimental data to test the contribution of advection to nutrient acquisition by phytoplankton are scarce, mainly because of the inability to imitate fluid motions in the vicinities of cells in natural flows, and difficulty to detect nutrient fluxes on the scale of interest. Thus, computational experiments are needed to analyze the contribution of advection to mass transfer and nutrient acquisition by phytoplankton. We present in this talk a mathematical model based on the immersed boundary method, that couples the interaction of non-motile diatom chains with the moving fluid and the nutrient. We apply our model to investigate the impact of shape, length, and flexibility of chains on nutrient uptakes in various flow regimes. Our numerical results obtained thus far confirm intuitive predictions, and open the door to possible experimental work.

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