

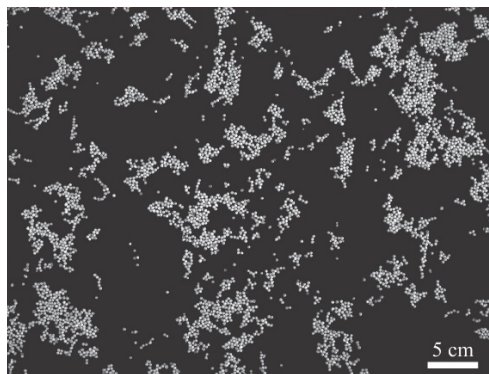
Particle Transport on the Surface of Turbulent Water

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Every year, millions of tons of plastics enter the ocean. Devising effective strategies to mitigate such pollution requires the quantitative understanding of how floating particles travel and spread. Past studies have mostly focused on the influence exerted by the surface on the flow underneath, while the characterization of the transport along the surface remains incomplete. I will summarize our recent experiments on small particles floating in turbulent water, using laboratory and field-scale facilities. The focus is on regimes where gravity and interfacial tension maintain the surface almost flat. Although the particles move in two dimensions, their transport is consistent with Kolmogorov's theory of three-dimensional turbulence. Due to the compressibility of the free surface, the particles cluster over spatio-temporal scales comparable to the integral scales of the turbulence. Capillarity-driven attraction breaks the equilibrium between cluster formation and breakup, thus the aggregates steadily grow in size. Particle size also matters: larger particles filter the small-scale velocity fluctuations, which results in a more time-correlated motion and, in turn, faster dispersion.



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