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Particles Dispersion on Fluid-Liquid Interfaces PUSHPENDRA SINGH, SATHISH GURUPATHAM, BHAVIN DALAL, M. HOSSAIN, IAN FISCHER, NJIT, D.D. JOSEPH, University of Minnesota — In a previous study we have shown that when small particles, e.g., flour, pollen, etc., come in contact with an air-liquid interface, they disperse in a manner that appears explosive. This is due to the fact that the capillary force pulls particles into the interface causing them to accelerate to a relatively large velocity. The motion of particles in the direction normal to the interface is inertia dominated, and so they oscillate vertically about the equilibrium position before coming to a stop under viscous drag. This vertical motion of a particle causes a radially outward lateral (secondary) flow on the interface that causes nearby particles to move away. The dispersion on a liquid-liquid interface was relatively weaker than on an air-liquid interface, and occurred over a longer period of time. This was a consequence of the fact that particles became separated while sedimenting through the upper liquid and reached the interface over a time interval that lasted for several seconds. The rate of dispersion depended on the size of particles, the particle and liquids densities, the viscosities of the liquids involved, and the contact angle. The frequency of oscillation of particles about their floating equilibrium increased with decreasing particle size on both air-water and liquid-liquid interfaces, and the time taken to reach equilibrium decreased with decreasing particle size.

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