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Structuring and Restructuring of Suspensions in Standing Waves in Tank with and without Topography

Vladmir A. Kalinichenko and Yuli D. Chashechkin

A. Yu. Ishlinski Institute for Problems in Mechanics of the Russian Academy of Sciences, Moscow, Russian Federation (chakin@ipmnet.ru, +7-499-739-9531)

We present and discuss novel experimental results concerning redistribution of initially uniform suspensions of fine particles in the 2D gravity surface standing waves in a rectangular tank oscillating in vertical direction. Flow visualizations and tracers velocity measurements with a digital high-speed video camera are used to study wave flow patterns above flat bottom and stationary sand vortex ripples. With time the density of initially uniform suspension is changed both in large and small scales. Non-stationary fast high gradient layers and vortex-like structures are arisen and disappeared. The formation and dynamics of long-living vortex structures in initially uniform suspension of aluminum powder particles caused by the interaction of the wave flow with sand ripples are experimentally investigated. Large-scale structures caused by coherent vortex shedding above the bed forms are gradually formed in suspension. Their horizontal scales are determined by bed forms extension, and the vertical scale grows in time. The region of changing suspension concentration extended from the bottom up to the free surface of liquid. Experiments with smooth bottom and horizontal rough sand layer have confirmed the results that the bottom topography determines the intensive structuring of suspended particles.