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Evolution of Suspension Sedimenting in a Container Bounded by Horizontal Walls

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Evolution of large-scale disturbances in sedimenting suspension is studied. The rectangular container is bounded by rigid walls in vertical direction and periodic in horizontal direction. Analytical solution is obtained for particle concentration and fluid velocity fields based on the continuum model of particle transport and linear-perturbation theory. The concentration inhomogeneities and velocity fluctuations are shown to decay with time. The decay is due to decrease of particles' number because of their deposition on the bottom wall and the variation of sedimentation-front shape. Calculated velocity fluctuations and correlation functions agree qualitatively with experimental values. Fluctuations evaluated in the middle of the cell grow linearly with the height of a cubic container, but saturate or even decrease as the container width grows and the height is fixed. The research was supported by Russian Foundation for Basic Research (Grant No. 02-01-00149).

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