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Laboratory observation of permanent and twinkled components of oscillating flow in rectangular basin with sand bottom

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The present study focuses on study of regular and twinkled flow components in standing gravity waves formed in resonance regimes of vertically oscillating rectangular basin with a sand bed partly filled with a fresh water. Shapes of the water free surface displacements, forms of deformable sand bed, a dye patterns and fine particles trajectories are registered by a high speed video camera mounted on the oscillation table. The registered large scale flow field consists of oscillating spatial mode and non-zero time-averaged flow. Twinkled components include narrow short time living jets and travelling vortices near a bed. It was found that resuspension of sand particles on a flat bed occurs intermittently in the regions of high shear under the standing waves nodes and happens in the form of the narrow localized wavy jets and vortex bursts. Gradually the bursts are regularized in space and transported sand particles form wavy bed patterns. The oscillating flow above the bed forms is characterized by a narrow jet-like separation on a bed-form crests and the repeated formation of vortices. Some speculations based on theory of periodic stratified flows are presented. Observations of beach waves are given for comparison with laboratory visualization of the flow.