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Experimental study of mixing in low gravity by vibrations ALIAKSANDR MIALDUN, YURII GAPONENKO, DENIS MELNIKOV, VALENTINA SHEVTSOVA, MRC, University of Brussels — In the absence of external forces, the diffusion process leads to the mixing of species on long time scale. The application of vibrations to a fluid system with density gradient causes relative flows inside the fluid. The aim of this study is to analyze the physical mechanism, by which vibrations affect the mixing process of two stratified miscible fluids. The rectangular cavity (10mm x5 mm x 3mm) filled half-by-half with the two different miscible liquids is subjected to translational vibration. The direction of translational periodic vibrations with a constant frequency and amplitude is parallel to the interface between the two fluids. The system is kept at constant temperature. There is strong interplay between gravity and vibrational impact. To elucidate the vibrational mechanism the experiments were performed in parabolic flights organized by the European Space Agency. Parabolic flights provide repeated periods of approximately 20 seconds of reduced gravity preceded and followed by 20 seconds of hypergravity. The transient evolution of concentration field during microgravity time is investigated by optical digital interferometry. The analysis of the results shows that mixing and flow pattern in liquids depends not only on vibration stimuli but on the sharpness of the interface as well.

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