Vibration effect on a stability of a displacement front TATYANA LYUBIMOVA, Institute of Continuous Media Mechanics UB RAS, DMITRIY LYUBIMOV, GRIGORIY SEDELNIKOV, Perm State University — Vibration effect on the stability of the displacement front between two immiscible fluids saturating porous medium is studied. Vibrations are orthogonal to the displacement front. Darcy model is implemented for the description of filtration. For high frequency vibrations it is shown in the framework of average approach that the vibrations make stabilizing effect. For finite-frequency vibrations the parametric instability zones are determined; it is found that both stabilization and destabilization of the displacement front are possible. For finite-amplitude perturbations numerical investigation based on unsteady non-linear equations is carried out by level set method for water-oil system saturating loamy soil. Temporal evolution of the displacement front shape is studied for various initial perturbations, vibration intensities and the displacement front motion velocity. The dependence of the time needed for the formation of isolated domains on the vibration intensity is obtained. It is found that the vibrations lead to the significant growth of perturbation wavelength and characteristic time scale of perturbation growth.

Tatyana Lyubimova
Institute of Continuous Media Mechanics UB RAS