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Bifurcations of free thermal vibrational convection in cylindrical fluid layer in micro-gravity numerical and analytical research ALBERT SHARIFULIN, Perm State Technical University — The analysis of vibration effect on non-isothermal fluid in closed cavity is important for planning technological experiments in space. Control and optimization of these processes critically depend on the understanding of liquid response to the vibrations. With this aim the theoretical investigation for infinite plane and cylindrical fluid layers are performed. We investigated simple case of the fluid response-thermal vibrational convection in a cylindrical fluid layer with rigid conducting boundaries. It is found that steady modes of thermal vibrational convection are subjected to various bifurcations. Bifurcations cause sharp changes in heat transfer. The Lorenz model is generalized (GLM) and used to conduct the analysis of bifurcations caused by the changing of the cavity shape and vibrational Rayleigh number. The shape of steady-state surface in 3D space of the streamfunction of mean flow, vibrational Rayleigh number and the cavity curvature is found. The numerical 2D solution is performed for plane and cylindrical fluid layers. The results of the analysis based on the GLM model are compared with the data obtained by direct numerical simulation. The bifurcation curve with extremum is found. Thus, bifurcations of complex shape could be observed. Comparisons with space experiments and its discussions are presented.

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