

Mathematical Models of Microconvection for Isothermally Incompressible and Weakly Compressible Liquids

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The term microconvection was originally introduced to characterize non-solenoidal flows driven by density (depending on temperature only) changes. These phenomena were analyzed for thermal buoyancy-driven convection (Pukhnachov, 1991) and for diffusive-induced flows (Perera and Sekerka, 1997). The effect on non-solenoidality is equally important for the description of non-stationary convection in microgravity conditions and in microscales. Recently this approach was extended up to convective motions of a weakly compressible liquid (Pukhnachov, 2002). On the basis of the microconvection model, there are studied a number of problems describing the convection in a vertical layer with the thermal fluxes oscillating in a phase and in an anti-phase, flows in a circular ring and in a prolate rectangular, mixed thermocapillary/gravitational convection in a semicircle with a free flat boundary.

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