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Three-dimensional oscillatory large-scale Marangoni convection in a binary liquid layer[1] ALEXANDER NEPOMNYASHCHY, SERGEY SHKLYAEV, ALEX ORON, Technion - Israel Institute of Technology — Marangoni convection in a binary liquid layer with nondeformable free surface is considered in the presence of the Soret effect. Both the thermocapillary and solutocapillary effects are taken into account. Oscillatory long-wave convection revealed by Oron and Nepomnyashchy (PRE, 2004) is investigated in detail. A set of amplitude equations describing the nonlinear evolution of three-dimensional perturbations is obtained and studied. Our weakly nonlinear analysis shows that three types of patterns can be stable near the stability threshold, namely: antiphase rectangles (AR), squares (AS), and asynchronous hexagons (AH). These patterns exhibit a superposition of either two (in the case of both AR and AS) or three (in the case of AH) standing waves shifted in phase. In the former case the waves amplitudes are equal to each other and the phase shift equals $\pi/2$. The AH patterns form a two-parametric family with the waves amplitudes depending on their phase shifts. Numerical simulations are carried out for square lattices. It is shown that at finite supercriticality traveling squares and other intermediate regime can be also stable in certain parameter domains.

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