FM15L_11893

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

3D Computer Simulation of Time-Depended Solutal Convection

Viatcheslav V. Kolmychkov(1), O.S. Mazhorova(1), Yu. P. Popov(1), P. Bontoux(2), M. El Ganaoui(3)

(1) *Keldysh Institute of Applied Mathematics RAS, Moscow, Russia*
(2) *Les Universites d'Aix-Marseille, Marseille, France*
(3) *Université de Limoges, Limoges, France*

The paper deals with computer simulation of natural convection in multicomponent solution. Three-dimensional calculations have been done to study the onset of convective motion and correspondent flow patterns. The process has been considered for Rayleigh number in range $1 * 10^3$–$4 * 10^4$. Numerical simulation confirm the existence of convective motion at Rayleigh numbers less than critical one predicted by stability analysis. The planform of subcritical convection and flow direction agree with theoretical data. The evolution of the flow pattern at Ra above the critical value is also consistent with theoretical predictions and experimental results. The numerical procedure is reliable and allows to perform long-time computer simulation of the convective motion in a wide range of operating parameters.

View the extended summary