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Spatio-temporal behavior of natural convection in low Prandtl number fluid YUJI TAsAKA, YUICHI MURAI, YASUSHI TAKEDA, Hokkaido University, TAKATOSHI YANAGISAWA, JAMSTEC — Natural convection appearing in liquid gallium layer, which has Prandtl number of 0.03, is investigated experimentally at the range of the Rayleigh number R , $10^3 < R < 10^5$. Spatio-temporal velocity distribution in the rectangular fluid layer measured by ultrasonic velocity profiler represents two kinds of periodic motion of convection roll; periodic movement of the roll and periodic variation of the size of the roll. Furthermore, simultaneous measurement of two velocity profiles clarifies existence of the wavy motion of the roll for the axial direction, which has been predicted by a stability analysis. Spatial distribution of the frequency of the periodic motion is investigated by frequency analysis of the obtained spatio-temporal velocity distribution. Variation of the period with respect to Rayleigh number is determined by frequency analysis of the temperature fluctuation measured by a thermistor. The frequency component cannot be detected at smaller Rayleigh number, under $R = 10^4$ and the frequency increases proportional to the Rayleigh number power 0.38.

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