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Experimental study on spatio-temporal behavior of a single particle forming a particle accumulation structure (PAS) in half-zone liquid bridge TAKERU OBA, Division of Mechanical Engineering, Graduate School of Science and Technology, Tokyo University of Science, ICHIRO UENO, TOSHIHIRO KANEKO, Department of Mechanical Engineering, Faculty of Science and Technology, Tokyo University of Science — We focus on particle behavior due to thermocapillary-driven convection in a half-zone liquid bridge of high-Prandtl number fluid. It has been known that the suspended particles exhibit a unique solid-like structure known as 'particle accumulation structure (PAS)' in a rotating frame of reference with traveling-type hydrothermal wave. It is said that PAS is caused by interaction between particles and the free surface of a half-zone liquid bridge. Such structures arise even under small Stokes number conditions. When observing PAS two-dimensionally, it looks like a closed single string, but the actual movement of particles is different. Therefore we employ three-dimensional particle tracking velocimetry to the half-zone liquid bridge of 2.5 mm in radius and 1.7 mm in height, and detect the particle behaviors close to the free surface. We explain the spatio-temporal correlation between the solid-like global structure of PAS and the local particle motions, and make comparisons with proposed physical models of PAS formation.

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