Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

Experimental investigation on coupling flows between liquid and liquid metal layers KANAKO YANO, YUJI TASAKA, YUICHI MURAI, YASUSHI TAKEDA, Hokkaido University, TAKATOSHI YANAGISAWA, Japan Agency for Marine-Earth Science and Technology, HOKKAIDO UNIVERSITY TEAM, JAPAN AGENCY FOR MARINE-EARTH SCIENCE AND TECHNOLOGY TEAM — This study aims to clarify coupling of flows between liquid metal and other usual liquids, e.g. water or oil, in fluid dynamical systems. In past studies for two-layer Rayleigh-Bénard system where the immiscible two liquids are layered, two types of coupling were observed; these are called as "mechanical coupling" and "thermal coupling." As a typical character of low Pr fluid, large-scale structure in the liquid metal layer has oscillating motion. In this study we investigate "thermal coupling" especially how the oscillation of cells in the liquid metal layer propagates to the upper liquid layer and vice versa by changing a ratio of the height of the layers and viscosity of the upper layer fluid. Visualization of the liquid metal motion was conducted by means of ultrasonic velocity profiling, and then the oscillating motion is expressed on the space-time velocity map. PIV measurement of the upper, transparent fluid layer shows the modulation of the convective motion due to the oscillation in the liquid metal layer. Point-wise measurement of temperature at several positions in the fluid layer represents the modulation quantitatively.

Kanako Yano
Hokkaido University

Date submitted: 04 Aug 2008 Electronic form version 1.4