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D 会場 ： 11/25　PM1（13:45-15:45）
14:00〜14:15:00

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Investigation of the thermal structure at the inner core boundary (ICB) in numerical dynamos including the latent heat at ICB

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Recent seismic observations suggest that inner the core has a seismic anisotropy. These studies suggest aspherical growth of the inner core, and that slow viscous deformation of the inner core and latent heat distribution are expected due to the aspherical growth of the inner core. To explain inner core anisotropy and aspherical growth of the inner core, a number of dynamo simulations have been performed with prescribed boundary conditions at ICB. In the present study, we perform thermally driven dynamo simulations with solving the heat equation throughout the inner and outer core, and investigate thermal structure at the inner and outer core boundaries which are generated by the flow motion in the outer core.

In the present model, we assume that the change of the topological change of the ICB is much smaller than the radial resolution, and that change of the position of ICB is proportional to the given radius of the average radius of the ICB. We also assume that the latent heat per volume is constant. Under the present condition, the latent heat at ICB makes the thermal diffusivity at ICB smaller than that in the other area. We implement and solve the present model into the heat equation throughout the center of the Earth to the core-mantle boundary in geodynamo simulations.

We perform /dynamo simulations with changing the thermal diffusivity at ICB to be from 1.0 (no latent heat) to 1x10^{-4} times of that in the other area and compare these results at the quasi-steady state to investigate the effects of the latent heat. The average amplitude of the Y_2^0 component in no latent heat case is approximately 0.78 times of that fixed heat flux cases. After introducing the latent heat, the Y_2^0 component of the temperature variation increases between 0.83 and 1.09 times of that of the fixed heat flux cases in the cases with less than 0.1 times of the thermal diffusivity at ICB.