

Prospect of particle method (MPS method) for an application to earth science

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We discuss a prospect of Moving-Particle Semi-implicit (MPS) method (Koshizuka and Oka, 1996) for an application to earth science.

MPS method is a kind of particle (Lagrangian) method applicable to incompressible flow.

In earth science, especially at simulation of mantle convection, Eulerian method, which means that evaluating points of physical values are fixed in the space like finite difference method or finite element method, is often used.

This Eulerian method cannot treat easily complex earth science problems such as multiphase flow, flow with free surface, moving boundary problem, or something.

It is because that the evaluating points are fixed in the space.

There are some special methods on Eulerian method for above-mentioned problems.

However, these methods often have some difficulties on the accuracy such as numerical diffusivity on chemical convection.

On the other hand, MPS method can treat above-mentioned problems naturally because of the advection of the evaluating points with flow.

In the presentation, we introduce simulations of thermal convection using MPS method and compare the results to the results of finite difference method.

We mention advantages of MPS method on thermal convection problem.