

Toward a global SPH simulation of an icy moon with internal ocean

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There are some traces of existence of internal ocean in some icy moons, such as a plumes of vapor of Europa and Enceladus. Since liquid water would be essential for the origin of life, it is important to understand the development of inner sea, especially the temperature distribution/evolution inside the icy moons. Thus, we aim to simulating the development of an internal ocean of an icy moon by 3-dimensional numerical fluid calculations using Smoothed Particle Hydrodynamics (SPH) method.

It is considered that the balance between the tidal heating caused by tidal acceleration and radiative cooling sustains liquid water beneath the surface of an icy moon. So, we added viscosity, conductive heat transfer and radiative cooling terms into the governing equations of SPH method. In addition, we take latent heat of phase transition into consideration. We will report the progress of our project toward a global SPH simulation of the internal ocean.

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