Thermal convection with evolving surface in a rotating icy satellite

Master's Thesis

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Abstract

This thesis is concerned with modeling the surface deformations and thermal convection in a rotating icy satellite. The system of governing equations, that we derive from general balance laws, is solved numerically using the finite-difference method on a staggered grid. Free surface is understood as implicitly described interface between the satellite and an almost massless medium with viscosity orders of magnitude smaller than ice. We design a numerical method capable of tracking the deforming surface. The numerical method is applied to models with temperature-dependent viscosity.

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