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Finite amplitude thermal convection in the porous methane-soaked regolith of Titan

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Abstract

Titan is the only body, other than the Earth where liquid is present on the surface. In the previous work (in press in Icarus) we consider behaviour of methane in the pores of Titan's regolith. Using numerical model we have found conditions necessary for the onset of convection (critical values of the Rayleigh number *Ra*: Ra_{cr}). These values indicate that the methane convection in Titan's regolith is possible even in region of moderate heat flow and moderate porosity. Presently we investigate finite amplitude convection for low and moderate values of Rayleigh number. The results indicate that convection in regolith could be an important factor determining thermal evolution and should be included in realistic models of Titan.