

Towards a new tool for modelling non-adiabatic giant planets

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Abstract

We present work in progress towards a modelling approach for the interior and evolution of giant planets. It follows the well-known method by Henyey et al. (1964) [1] for stars. In contrast to conventional modelling assumptions for Jupiter and Saturn [2] and Uranus and Neptune [3], our goal is to go beyond the premise of adiabatic interiors, as the presence of stably stratified and thus non-adiabatic regions is indicated by some magnetic field models for the ice giants [4]. Therefore, we solve self-consistently for the local temperature gradient, the compositional gradient and the heat flux, accounting for heat and particle transport by convection and diffusion. This way we hope to gain new insight into the origin of the low intrinsic luminosity of Uranus and the high intrinsic luminosity of Neptune. Here, we present the theoretical foundations and implementation of the model as well as first results.

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References

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