



## **Modeling the rotation of Mercury including pressure coupling**

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We present an adaptation of the Poincare model of core-mantle interaction (Poincare 1910, Touma & Wisdom 2001) to Mercury, in which the planet is seen as composed of a rigid mantle and an elliptical liquid core. Thanks to a Hamiltonian formulation, we perform extensively both an analytical (Lie transforms) and a numerical analysis of this 4-degree of freedom problem. This gives first results on the longitudinal librations of Mercury, depending of the size of the core, that should be observed by MESSENGER and BepiColombo. Moreover, it shows a long-term behavior of the obliquity, the consequences of the proximity of a resonance between the spin frequency of Mercury and the free core nutation, and also the influence of the polar flattening of the core. This model helps to model the rotation of Mercury for the radio-science experiment (MORE) of BepiColombo.