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Matthieu Leroy and Rony Keppens
KU Leuven, Wiskunde, CmPA, Leuven, Belgium (matthieu.leroy@wis.kuleuven.be)

**Influence of environmental parameters on the Kelvin-Helmholtz instability at the magnetopause**

**M. Leroy**[1], **R. Keppens**[1]

[1] Centre for mathematical Plasma-Astrophysics, Department Wiskunde, KU Leuven, Celestijnenlaan 200B, bus 2400, B-3001 Leuven, Belgium

The process dominating the development of a large boundary layer at the interface between the solar wind (SW) and the magnetosphere (MS) during northward interplanetary magnetic field is still not fully understood. However the Kelvin-Helmholtz instability (KHI), which can induce magnetic reconnection events through its non-linear phase vortices, being the major actor is in good agreement with the observations around the magnetopause so far. Numerous numerical studies have investigated the topic with many interesting results but most of these were considering two-dimensional situations with simplified magnetic configuration and often neglecting the inhomogeneities for the sake of clarity.
Given the typical parameters at the SW/MS interface, the situation must be considered in the frame of Hall-MHD, due to the fact that the current layers widths and the gradient lengths can be in the order of the ion inertial length. As a consequence of Hall-MHD creating a third vector component from two planar ones, and also because flow and magnetic field variations in the equatorial plane can affect the field configuration at a distance in all directions and not only locally, the simulations must also be performed away from the equatorial plane and a three-dimensional treatment is necessary.
In this work, different configurations than can occur in the KHI scenario are studied in a three-dimensional (3D) Hall-MHD setting, where the double mid-latitude reconnection (DMLR) process exposed by Faganello, Califano et al. is triggered by the equatorial roll-ups. Their previous work is extended here with in particular a larger simulation box and the addition of a density contrast and variations of the interface configuration. The influence of various parameters on the growth rate of the KHI and thus the efficiency of the DMLR is assessed. In the scope of assessing the effect of the Hall term on the physical processes, the simulations are also performed in the MHD frame. These different configurations may have discernible signatures that can be identified by spacecrafts diagnostics, therefore fields and particles data that would be recorded by spacecrafts during such an event are simulated and compared to real in-situ data.