José Miguel
Espinoza Acosta
University of Santiago de Chile
Rodrigo López, University of Santiago de Chile.
Marina Stepanova, University of Santiago de Chile.
Elizaveta Antonova, Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State University (1), Space Research Institute RAS (2), Moscow, Russia.
Poster
The balance between the solar wind's dynamic pressure and the Earth's magnetosphere, known as magnetostatic equilibrium, is a fundamental aspect of space physics and is crucial for understanding space weather phenomena. Both historical and contemporary data have underscored the significance of this balance, which is described by the Grad-Shafranov equation. This equation provides a nuanced correlation between plasma pressure gradients and fluctuations in the geomagnetic field. In this study, we introduce an advanced model employing a dipolar approximation of the magnetic field, integrated with specific conditions derived from magnetohydrodynamic equations in order to obtain a self-consistent solution between plasma pressure profiles and the geomagnetic field during strong geomagnetic storms. Our methodology incorporates numerical and mathematical techniques, with a focus on finite difference discretization for solving partial differential equations. We compare our results with empirical data from space missions such as RBSP and THEMIS. Our preliminary results offer a more comprehensive insight into the modulation of the geomagnetic field by plasma pressure gradients, ultimately leading to more accurate models of the Earth’s magnetosphere dynamics based on the Dst index.

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