

The effect of a Fisk-type field on Jovian and Kronian electrons

N. E. Engelbrecht*, R. A. Burger*, S. E. S. Ferreira* and M. Hitge*

**Unit for Space Physics, North West University, Potchefstroom, South Africa.*

Abstract. The behaviour of low-energy Jovian electrons in a Fisk-Parker hybrid field is investigated, and compared to the behaviour of such particles in a pure Parker field, utilizing a steady-state 3D numerical modulation code. The hybrid model for the heliospheric magnetic field is Parker-like in the ecliptic region where the two sources occur, and Fisk-like at higher latitudes. In order for the electrons to be influenced by the Fisk-type field, they first need to diffuse across field lines. The choice of diffusion coefficients is therefore highly pertinent. In the current project we use an ab initio approach for the elements of the diffusion tensor, but use approximations for the relevant turbulence quantities rather than a separate model for the evolution of the turbulence. Drift effects are unimportant for these low-energy electrons, and thus are neglected. Our preliminary results show that the Fisk-type field does influence the transport of Jovian electrons in latitude, but that the magnitude of these effects is highly dependent on the behaviour of the perpendicular diffusion coefficient as function of magnetic field magnitude at the source of these particles. Initial results on the simultaneous behaviour of Jovian and Kronian electrons in the ecliptic plane will be discussed, and appear to indicate a presence of Kronians in the inner heliosphere. The financial assistance of the National Research Foundation (NRF) towards this research is hereby acknowledged.

Keywords: Cosmic rays, Fisk-type fields, Jovian electrons, Kronian electrons.