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Study of empirical electron density models using stereoscopic observations of solar Type III burst

Mohammed Y. Boudjada (1), Emad Al-Haddad (2), Patrick Galopeau (3), Milan Maksimovic (4), and Helmut O. Rucker (1)

(1) Space Research Institute, Austrian Academy of Sciences, Graz, Austria, (2) University of Applied Sciences, Graz, Austria, (3) Université Versailles St-Quentin, CNRS/INSU, LATMOS-IPSL, Guyancourt, France , (4) Observatoire de Paris-Meudon, Meudon, France

We study the properties of solar Type III radio bursts that were simultaneously observed by RPWS/Cassini, URAP/Ulysses and WAVES/Wind experiments. The observations covered a time interval of about one year during which the spacecraft trajectories where localized in the ecliptic plane for Wind and Cassini, and at high heliographic latitudes (of about -75°) for Ulysses spacecraft. The data set consists of the flux density and the arrival time as a function of frequency in the range of a few kHz to 16 MHz. This leads us to determine the time profiles associated to the electron beam evolution along the interplanetary magnetic field where the trajectory is supposed to be an Archimedean spiral. We assume that the trajectories are contained in the plane of the ecliptic and the velocity of the solar wind is constant and equal to 400 km/s. Several empirical models of electron density are considered in the estimation of the electron beam evolution. We show that some of these models may be used to outline the real Type III burst trajectory, and others not. We discuss the particularity of each model and we attempt to classify them taking into consideration the different regions where the radio was propagating, i.e. the solar corona (few solar radii) and the interplanetary medium up to the orbit of the Earth ($\sim$ 1 AU) and Jupiter ($\sim$ 5 AU).