The three-dimensional drift velocity field inside the heliospheric termination shock

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Abstract: During periods when particles are drifting into the heliosphere through the region swept out by the wavy neutral sheet, particle intensities react significantly to changes in the tilt angle during periods of low to moderate solar activity. It is therefore of great importance to construct accurate models for the drift velocity field to study such changes. When the neutral sheet is flat, there is more than one way to handle drift along it in numerical modulation models, and benchmark studies have been published. However, there appears to be no consensus on how to deal with drift along a wavy neutral sheet which is necessarily a fully three-dimensional structure. Moreover, there is as yet no theory for the drift coefficient in a turbulent magnetic field that has been successfully tested against direct numerical simulations, in contrast to the case for the parallel- and perpendicular diffusion coefficients. We present a recently developed three-dimensional drift velocity field that includes the drift along a wavy neutral sheet, and also discuss how the effect of turbulence on drift can be included in numerical modulation models in the absence of a benchmarked theoretical description.

Keywords: Modulation models, heliospheric neutral sheet, particle drifts.