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CLUSTER observations in the magnetosheath: 2. Intensity of the "whistler" turbulence

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In a companion poster by Mangeney et al. (CLUSTER observations in the magnetosheath: 1. Anisotropies of the turbulence) we show that the intensity δB^2 of the magnetic fluctuations in the so-called "whistler" range (observed by Cluster around the lower hybrid frequency) depends strongly on the angle Θ_{BV} between the local magnetic field B and the local flow velocity V: δB^2 is at least 10 times more intense when $\Theta_{BV} = 90°$ than when $\Theta_{BV} = 0°$. We show here that δB^2 depends on two other parametres. i) δB^2 increases when the local ram pressure NV^2 increases (N is the plasma density), and more generally when the solar wind ram pressure increases. ii) for a given solar wind ram pressure, δB^2 depends on a geomagnetical factor, the difference θ_{CB} between the clock angle of the position of Cluster in the Y_{GSE}, Z_{GSE} plane and the clock angle of the B field. Indeed, 3D MHD simulations of the magnetosheath flow show that the flow speed is larger (so that the local ram pressure and thus δB^2 is larger) and that the angle Θ_{BV} is larger (so that δB^2 is still larger) when the angle θ_{CB} reaches $\pm 90°$. The clock angle of B is roughly the same in the solar wind and in the magnetosheath. Thus, the magnetosheath regions where the "whistler" intensity is stronger are the flanks which are in the plane perpendicular to the direction of the IMF through the Earth.