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Turbulent behaviour of Hot Flow Anomaly plasma fluctuations recorded by the Cluster space mission

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The paper concerns with the investigation of the nonlinear properties of the plasma dynamics inside hot flow anomalies (HFA). The HFAs are high-energy plasma populations that occur in the solar wind near the planetary bow shocks due to the convergence of upstreaming particles towards a tangentional discontinuity plane in the solar wind. The convergence is driven by convectional electric field having opposite sign in the different sides of the discontinuity. The typical changes of the plasma parameters inside HFAs (increased plasma temperature, low bulk velocity, increased magnetic fluctuations, etc.) have been thoroughly interpreted by the records of space missions (e.g. Cluster). In some of our previous studies it was shown that magnetic fluctuations in the HFAs are non-Gaussian relying to turbulent physical processes. In this study the turbulent behaviours are investigated in several HFA events through spectral, structure function and dimension analyses. With the latter our aim is to show the high number of degrees of freedom inside the HFAs with the use of phase-space reconstruction studies. In the analyses the 67 Hz and 22.5 Hz magnetic records of the Cluster probes are used by which more than 100 HFA events have been identified, so far.