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An Integrated Nonlinear Analysis library - (INA) for solar system plasma turbulence

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We present an integrated software library dedicated to the analysis of time series recorded in space and adapted to investigate turbulence, intermittency and multifractals. The library is written in MATLAB and provides a graphical user interface (GUI) customized for the analysis of space physics data available online like: Coordinated Data Analysis Web (CDAWeb), Automated Multi Dataset Analysis system (AMDA), Planetary Science Archive (PSA), World Data Center Kyoto (WDC), Ulysses Final Archive (UFA) and Cluster Active Archive (CAA). Three main modules are already implemented in INA : the Power Spectral Density (PSD) Analysis, the Wavelet and Intemittency Analysis and the Probability Density Functions (PDF) analysis.The layered structure of the software allows the user to easily switch between different modules/methods while retaining the same time interval for the analysis. The wavelet analysis module includes algorithms to compute and analyse the PSD, the Scalogram, the Local Intermittency Measure (LIM) or the Flatness parameter. The PDF analysis module includes algorithms for computing the PDFs for a range of scales and parameters fully customizable by the user; it also computes the Flatness parameter and enables fast comparison with standard PDF profiles like, for instance, the Gaussian PDF. The library has been already tested on Cluster and Venus Express data and we will show relevant examples.

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