FFTSINT: A TOOL FOR RECURRENCE ANALYSIS OF PEAKS IN THE SPECTRAL ANALYSIS OF DAILY HYDROLOGIC SERIES

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- ABSTRACT: This article discusses methodologies for describing fluctuations in flow and in flood levels of aquatic ecosystems. It discusses the role of how significant a recurrence must be for a process to have adaptive value. The available methods for testing periodicities are discussed, together with the limitations where it is assumed that time series are reversible, as in applications of traditional methods for significance testing of peaks. As time series of flows and water levels are irreversible, an alternative method is proposed for testing the significance of periodogram peaks, based on probabilities obtained by generating synthetic series. Given these probabilities, significant frequencies can be identified by filtering and the original series can be reconstructed by means of the inverse Fourier transform. In this process the proportion of total variance remaining in the filtered series can be adjusted, thus simulating signal amplification. The program FFTSint is presented which uses the methodology for generating significant hydrologic series filtered for different levels of significance (α) and for different levels of signal amplification. The methodology was tested using a flow series from the gauging station at Rosário do Sul, on the Rio Santa Maria, Rio Grande do Sul, Brazil.

- KEYWORDS: FFT; peaks significance; synthetic series; fitness; hydrologic series; riparian ecology.

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