

TIME SERIES ANALYSIS IN ASTROPHYSICS

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The book brings together in a coherent way the results from the Time Series studies in mathematics, astronomy, geophysics and other branches of science, where periodicity, power spectra and underlying model for the observational data should be investigated. Emphasized are irregularly spaced data analysis, searching for the periodicity and the events counting, which is widely used now in the physical measurements. The computational algorithms are given for the described methods, as well as a number of model and real cases. The same data examples are used throughout the analysis to illustrate various approaches.

The book intends to a wide circle of the readers, both students and investigators.

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Time Series Analysis. Any metric that is measured over regular time intervals forms a time series. Analysis of time series is commercially important because of industrial need and relevance especially w.r.t forecasting (demand, sales, supply etc). A time series can be broken down to its components so as to systematically understand, analyze, model and forecast it. This is a beginner's introduction to time series analysis, answering fundamental questions such as: What are the components of a time series. What is a stationary time series. Much astrophysics time series are unevenly spaced in time which abate the power of ordinary Fourier transform. A method to find the true Fourier spectrum for unevenly spaced time series is developed. It is found that the true Fourier spectrum associates with the conventional Fourier spectrum by a system of linear equations so it can be obtained by a method of iterative process. It is an effective method for detecting and describing the true multiperiodic signals even in the case that some strong peaks in a conventional Fourier spectrum occur at spurious frequencies. For the true Fourier spectrum