

# Unevenly sampled time series analysis in astrophysics

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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 composed of finite isolated harmonic components, this method gives a better estimation of the frequencies and amplitudes. This method is tested by simulated time series and the published data for several blazars. Then it is applied to some radio variabilities of a sample of blazars. In some cases, typical timescale of several decades are found, indicating that this method is of high capability even in finding some very low frequency signals.