Have the underlying functions of the light curves of pulsating stars the property of analyticity?

It is only guaranteed that a function has a convergent Fourier expansion, i.e., the DFT converges to the real frequency content of the time series, when the function is analytic.

We propose to study analyticity of the underlying function of time series through the “connectivities”.

Weaver Function

\[ f(t) = \sum_{n=-\infty}^{\infty} e^{i 2\pi n t} \]

An example of a non-analytic function defined as a finite sum of harmonic functions and its prewhitening cascade.

Conclusions:

1) Photometric time series of pulsating stars as observed by space satellites are not connected.
2) The time series of the data associated to the claimed detection of gravitational waves from the target LIGO GW150914 is not connected.
3) We have put in question the implicit paradigm of the analyticity of the underlying function in astronomical observations. The extension of this conclusion to other fields is in progress: application to the CMB and the Allen Telescope Array data.