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Some improvements of Hilbert-Huang transform for time-frequency analysis of gravitational waves

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Many gravitational-wave events from mergers of binary stars consisting of black holes and neutron stars have been observed, while gravitational waves from supernovae have not been observed yet.
Investigating temporal changes in the frequency and amplitude of gravitational waves is important for studying the physics of gravitational wave sources. For time-frequency analysis of gravitational waves both from mergers and supernovae, we are proposing to use the Hilbert-Huang transform (HHT), which comprises empirical mode decomposition (EMD) followed by Hilbert spectrum analysis. An essential aspect of the EMD involves the generation of envelopes through interpolating extrema values. The original EMD utilizes cubic spline interpolation, but it occasionally becomes unstable and it will reduce performance of the EMD.
Now we propose extended versions of the HHT, including substituting Akima spline interpolation for the cubic spline and careful treatment near both ends of time series data. In addition, the code was parallelized using MPI to reduce computation time.
In this talk, we will show the results of comparing the original HHT and the proposed HHT.

Submitted on behalf of a Collaboration?

No

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