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Removing Periodic Noise: Application to Real Data and Advancing to Frequencies Shifting in Time

We are developing a method for removing periodic noise from recordings to detect weak impulse events. This could be used e.g. for seismic aftershock monitoring during CTBTO on-site inspections (OSI) where weak pulses may sometimes be masked by engine signals. We have continued our work (shown at ISS09, S&T11). By gradually fitting the frequency, amplitude and phase of a sine function to each single peak in the complex spectrum, subtraction of periodic noise is possible. The general procedure as well as a quantitative analysis of a helicopter flyby is shown. Of three planned improvements: 1. changing frequency, 2. neighbouring peaks, 3. simultaneous fitting of all peaks, we work on the first. To better work with real signals we analyse frequencies shifting linearly in time. The expression for the spectrum gets more complicated, an approximation has to be used. Problems appearing during implementation of the fitting algorithm are discussed, e.g. the initialisation of the four start parameters (the fourth is the frequency rate of change) is crucial.

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