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ALIF: a new promising technique for the decomposition and analysis of nonlinear and nonstationary signals

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Abstract

Nonlinear and nonstationary signals are ubiquitous in real life. Their decomposition and analysis is of crucial importance in many research fields. Traditional techniques, like Fourier and wavelet Transform have been proved to be limited in this context. In the last two decades new kind of nonlinear methods have been developed which are able to unravel hidden features of these kinds of signals. In this talk we will review the state of the art and present a new method, called Adaptive Local Iterative Filtering (ALIF). This method, developed originally to study mono-dimensional signals, unlike any other technique proposed so far, can be easily generalized to study two or higher dimensional signals. Furthermore, unlike most of the similar methods, it does not require any a priori assumption on the signal itself, so that the method can be applied as it is to any kind of signals. Applications of ALIF algorithm to real life signals analysis will be presented. Like, for instance, the behavior of the water level near the coastline in presence of a Tsunami, the length of the day signal, the temperature and pressure measured at ground level on a global grid, and the radio power scintillation from GNSS signals.