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Detection of weak signals based on a new class of transformations of random series

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Abstract

For detecting weak signals (when their amplitude is comparable with the amplitude of the noise track) a new class of transformations of random series to a straight line has been suggested. It has been shown that these transformations are quasi-linear and can be defined as a signal-t--staircase transformation (SST). The height of a step defines an amplitude of the detected signal and the step length its duration. The SST can be applicable for a wide class of random series having different statistical nature. The verification of this new method based on the analysis of the real signal/noise tracks containing registration of different earthquakes with small amplitudes has been realized. It has also been shown that different situations which have been found from the real-data analysis demonstrate the high sensitivity and efficiency of the new method suggested.

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