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The Use of Wavelet Transformation Techniques in Structure of an Artificial Neural Network for Recognition of Early Arrival of Earthquakes on Strongly Noisy Seismic Records

The problem of automatic (in real time) recognition of seismic signals of the occurred earthquake is very important now. It is especially key for autonomous systems operating with an increased level of seismic noise, often having anthropogenous sources of an origin. This situation is typical when sensor systems are installed inside houses and buildings located in large cities or near big industrial facilities, airports, railways, and so on. In these cases, the first place is a problem to develop specialized processing system (algorithms) for noisy seismic signals received from local seismic sensors. The use of wavelet transform algorithm is embedded in the functioning of neural networks to allows significantly improve the accuracy of identification of early arrival of an earthquake in comparison with a systems based only on using of artificial neural networks or wavelet transform. Preliminary testing of the proposed system was made with using numerous data of real earthquakes (additional anthropogenous noise was added to data before test processing) recorded during the aftershock activity of the earthquake in Japan on 11 March 2011.

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