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Analysis of the geophysical data using a posteriori algorithms

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The problems of monitoring, prediction and prevention of extraordinary natural and technogenic events are priority of modern problems. These events include earthquakes, volcanic eruptions, the lunar-solar tides, landslides, falling celestial bodies, explosions utilized stockpiles of ammunition, numerous quarry explosion in open coal mines, provoking technogenic earthquakes. Monitoring is based on a number of successive stages, which include remote registration of the events responses, measurement of the main parameters as arrival times of seismic waves or the original waveforms. At the final stage the inverse problems associated with determining the geographic location and time of the registration event are solving. Therefore, improving the accuracy of the parameters estimation of the original records in the high noise is an important problem. As is known, the main measurement errors arise due to the influence of external noise, the difference between the real and model structures of the medium, imprecision of the time definition in the events epicenter, the instrumental errors. Therefore, posteriori algorithms more accurate in comparison with known algorithms are proposed and investigated. They are based on a combination of discrete optimization method and fractal approach for joint detection and estimation of the arrival times in the quasi-periodic waveforms sequence in problems of geophysical monitoring with improved accuracy. Existing today, alternative approaches to solving these problems does not provide the given accuracy. The proposed algorithms are considered for the tasks of vibration sounding of the Earth in times of lunar and solar tides, and for the problem of monitoring of the borehole seismic source location in trade drilling.