Determination of moment tensor and location of microseismic events under conditions of highly correlated noise based on the maximum likelihood method

Birialtsev E., Demidov D., Mokshin E.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2017 European Association of Geoscientists & Engineers.We examine the problem of localization of a single microseismic event and determination of its seismic moment tensor in the presence of strongly correlated noise. This is a typical problem occurring in monitoring of microseismic events from a daylight surface during producing or surface monitoring of hydraulic fracturing. We propose a solution to this problem based on the method of maximum likelihood. We discuss mathematical aspects of the problem, some features and weak points of the proposed approach, estimate the required computing resources, and present the results of numerical experiments. We show that the proposed approach is much more resistant to correlated noises than diffraction stacking methods and time reverse modeling.

Keywords

Correlated noise, Hydraulic fracturing, Maximum likehood, Microseismic monitoring, Seismic moment tensor