

Spatial Filtering of Seismic Events Occuring in Hydraulic Fracturing

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Abstract: The paper proposed and built a three-dimensional model of fracture zones producing formation during fracturing. To eliminate data redundancy locations original spatial filtering has been applied.

Key words: Hydraulic fracturing, crack, proppant, micro-earthquakes, filtration, Delaunay triangulation.

REFERENCES

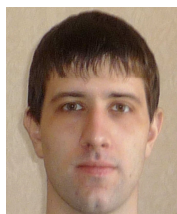
- [1] Zheltov Ju. P. *Mehanika neftegazonosnogo plasta* / M.: Nedra, 1975. 217 s.
- [2] Ju. L. Novakovskij, E. V. Rabinovich, A. S. Turkin. *Opredelenie razmerov zakreplennyh treshhin, obrazujushhihsja pri gidravlicheskom razryve plasta* // *Jekspozicija Neft' Gaz*. 2012. №4. S. 95–97.
- [3] Il'inskij A.D. *Lokacija ochagov mikrozemletrjasenij pri passivnom sejsmicheskom monitoringe gidrorazryva plasta* / A.D. Il'inskij, M.A. Krasnova // *Sejsmicheskie pribory*. 2009. T. 45, № 3. S. 14-40.
- [4] Mahrer K.D. *Hydraulic fracture height in cased wells* // *Geoexploration, [Pap.] Int. Symp. Borehole Geophys. Petrol., Hydrogeol., Min. and Eng Appl*. 1991. V. 28. P. 221–250.
- [5] Rabinovich E. V., Novakovskij A. Ju. *Sejsmicheskaja izmeritel'naja sistema dlja lokalizacii treshhin pri gidrorazryve neftjanogo plasta*. // *Identifikacija, izmerenie karakteristik i imitacija sluchajnyh signalov (sostojanie, perspektivy razvitija): Sbornik materialov konferencii*. 2009. S. 171–174 .
- [6] E. V. Rabinovich, A. S. Turkin, Ju. L. Novakovskij. *Nazemnaja lokacija mikrozejsmicheskikh signalov dlja monitoringa gidravlicheskogo razryva plasta* // *Doklady TUSUR*. 2012. № 1(25). Ch. 1. s. 104–112.
- [7] Nikolenko S. I. *Algoritmy klasterizacii / Mashinnoe obuchenie – ITMO, 2006*. // [Jelektronnyj resurs] Rezhim dostupa: <http://logic.pdmi.ras.ru/~sergey/teaching/ml/11-cluster.pdf>, svobodnyj (data obrashhenija: 14.05.2012).
- [8] Voroncov K. V. *Lekcii po algoritmam klasterizacii i mnogomernogo shkalirovanija / Mashinnoe obuchenie – 2010*. // [Jelektronnyj resurs] Rezhim dostupa: <http://www.machinelearning.ru/wiki/images/c/ca/Voron-ML-Clustering.pdf>, svobodnyj (data obrashhenija: 14.05.2012).
- [9] Fred L. N. *Combining Multiple Clusterings Using Evidence Accumulation* / L. N. Fred, A. K. Jain. // *IEEE Transactions on Pattern Analysis and Machine Intelligence*. 2005. Vol. 27, No. 6. p. 7–11.
- [10] Bailey M. *Automated Classification and Analysis of Internet Malware* / M. Bailey, J. Oberheide, J. Andersen. // *Recent Advances in Intrusion Detection*. 2007. pp. 188–194.
- [11] Theodoridis S. *Pattern Recognition* / S. Theodoridis, K. Koutroumbas. - Academic Press, Inc. USA, 2009. 494 p.



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