

Using Multiple Downhole VSP Arrays for Monitoring and Locating Passive Microseisms in the Oil Reservoirs

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Abstract/Excerpt

Using a classical hypocenter location method, which depends only on the first arrival times, the uncertainties of the hypocenter location as determined by a microseismic monitoring network composed of multiple VSP downhole geophone arrays in the surrounding wells is calculated. Error analysis illustrates that if the multiple arrays are properly designed, the events recorded by this kind of monitoring network can be located at an accuracy of 5-10 m in the areas between the arrays. Compared to the well-used single-VSP monitoring array method, which needs the combination of azimuths, angles of inclination, and differences between P- and S- arrivals, the multiple downhole VSP arrays method has the advantages of being convenient, reliable and more accurate in hypocenter location.