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A forward modeling method based on electromagnetic theory to measure the parameters of hydraulic fracture

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Hydraulic fracturing is the pivotal technology of tight unconventional reservoir, and accurate monitoring of fracture morphology is related to fracturing effect evaluation, well productivity prediction and the follow-up measures. Compared with traditional methods, electromagnetic monitoring can obtain the Effective Propped Volume (EPV) that actually reflects the productivity, solve the abuse such as low fracture identification accuracy, limited by the specific time. This paper introduces a physical and numerical model that uses electromagnetic characteristics to accurately monitor the parameters of the fracture. A triaxial transmitting - triaxial receiving instrument which is approximate to the construction site is set up, the relationship of electromagnetic

monitoring signals and the fracture parameters is obtained. By placing the transmission source plane perpendicular to an appropriate coordinate axis in a three-dimensional rectangular coordinate system the length and height of the fracture could be monitored by the signal of the long receiver while the transmitting source surface being perpendicular to the Z-axis. The azimuth could be inverted according to the magnitude of the signal peak when the transmitting source surface is perpendicular to the X-axis. The sign of azimuth could be determined by setting a M-axis (the Z axis rotates counter-clockwise 45 degrees in the XZ plane).

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