Hydraulic Fracture *b* -Value from Microseismic Events in Different Regions

Neda Boroumand[1]

[1]Halliburton, Calgary, Alberta, Canada (neda.boroumand@pinntech.com)

Abstract

The recorded magnitude of the microseismic events is predominantly a result of the hydraulic fracturing process. The term *b* -value is simply a linear relationship that results when the logarithm of the frequency of events is plotted versus their magnitude. A larger *b* -value implies that more small magnitude events occur and fewer large ones, which results in a steeper slope. A small *b* -value implies that more large magnitude events occur and fewer small ones, which cause a lower *b* -value. A comparative analysis is performed on *b* -values derived from microseismic data recorded in different unconventional oil and gas resource plays. This analysis is based on the Gutenberg-Richter relation. The analysis of the datasets used in this study show that the computed *b* -value from microseismic varied across different regions. The Initial findings show that *b* -values for the Bakken, Barnett, Eagle Ford, Marcellus, Montney and Muskwa formations are 2.32, 2.45, 1.09, 2.01 and 1.05 respectively. These values deviate from the typical *b* -value of about 1 found in earthquake seismology. While the *b* -value parameter is influenced by some reservoir elastic properties, in-situ stress conditions and fluid treating parameters, this deviation can also be primarily a consequence of catalogue incompleteness.

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