Hydraulic fractruring pressure curves as a way for determining reservoir parameters

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This paper describes various ways to study pressure drop curves in the fractured well obtained from laboratory experiments of the creation and propagation of a hydraulic fracture. The information content of the data is determined in the present work. The task of the study was to determine the fracture closure pressure which is locally necessary for the correct numerical simulation of the hydraulic fracturing experiment and globally for solving various applied problems in the development of oil fields.

At the moment there are at least three techniques of determination of fracture closure pressure which are based on plotting different graphs of dependence of the derivatives and logarithmic derivatives of the hydraulic fracture pressure on: a) G-function (some function of time), b) time in logarithmic scale and c) square root of time. These techniques are derived from analytical solutions of filtration problems for the system (reservoir + well + fracture) in various approximations. Applying these approaches to experimental data, the fracture closure pressure is determined by the behavior of derivatives and semilog derivatives of fracture pressure.

In the framework of the study, the plotting of various dependences of pressure derivatives on some functions on time was carried out for the two most satisfactory experimental pressure drop curves. The determining criterion for the selection of suitable experimental data was the duration of data recording after stopping the injection of a fracturing fluid into the well to increase the likelihood of fracture closure The main results of the presented work include the determination of the fracture closure pressure in the experiments and a comparison of the values found with the minimum horizontal stress created in the sample.