

EXPERIMENTAL DETERMINATION OF GEOMECHANICAL AND PETROPHYSICAL PROPERTIES OF JACKFORK SANDSTONE – A TIGHT GAS FORMATION

Zhengwen Zeng

New Mexico Petroleum Recovery Research Center, Socorro, NM, USA

Jean-Claude Roegiers

The University of Oklahoma, Norman, OK, USA

Reid B. Grigg

New Mexico Petroleum Recovery Research Center, Socorro, NM, USA

ABSTRACT

Jackfork sandstone formation is widely distributed in the Ouachita Mountain area in southeastern Oklahoma and southwestern Arkansas. It has become of interest in recent years because substantial gas reserves have been found in it. As the formation is very tight, hydraulic fracturing treatments are normally required. A systematic investigation on the petrophysical and geomechanical properties of the formation is needed to the success of future exploration and development of the gas reserves in this formation. This paper presents the laboratory measurements of petrophysical and geomechanical properties of the Jackfork sandstone. Petrophysical properties measured include porosity, permeability, bulk density, grain density, and seismic velocity; some of them were measured in both horizontal and vertical directions. Geomechanical properties determined are uniaxial tensile strength, uniaxial compressive strength, triaxial strengths under three different confining pressures, Young's modulus, Poisson's ratio, cohesion, angle of friction, and Mode-I fracture toughness. For each measured property, a brief comment was given on its potential applications in future reservoir exploration and development. In addition, a detailed introduction on the upgrading and application of the CDISK method for Mode-I fracture toughness measurement on small samples is given.