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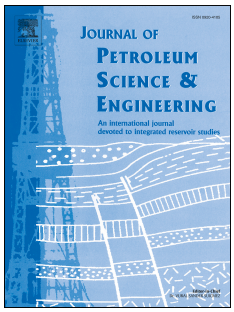

Rheological and breaking studies of a novel single-phase surfactant-polymeric gel system for hydraulic fracturing application

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Rheological and Breaking Studies of a Novel Single-Phase Surfactant-Polymeric Gel System for Hydraulic Fracturing Application

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Abstract

Fewer studies have dealt with the interactions between polymer gel and surfactant fluids and their applications in hydraulic fracturing as a mutual system. Conventional polymer fracturing fluids employed in the early decades exhibited residue deposition within the fracture while surfactant fluids with lower thermal stability have been inefficient in stimulating hydrocarbon production, urging the need for an improved fluid system with improved rheology, proppant carrying capacity, lower fluid loss and better post-fracture cleanup. In this paper, a novel fracturing fluid is synthesized by combining a polymer gel system (carboxy methyl hydroxyl propyl guar-CMHPG) and a surfactant based viscoelastic fluid (sodium oleate-an anionic surfactant) and it is reported to have improved properties due to the synergistic effects of the dual systems at slightly reduced polymer loading. The microemulsion gel region was identified by preparing the pseudo ternary phase diagram and the optimum gel formulations were selected for the present study. The prepared SPME gel showed improved rheology with higher thermal stability, better clean up properties with lesser residues as compared to the individual one.

Keywords

Hybrid System, Polymeric-Surfactant, Fracturing fluid, Unconventional Reservoirs, Thermal Stability, Rheology

1. Introduction

Well stimulation plays a significant role in the economic development of oil and gas reservoirs as the energy demand is increasing over the years and there is continuous fall in production from many conventional reservoirs. Hydraulic fracturing is a commonly used technique to stimulate