

عنوان مقاله:

An Estimation of Wave Attenuation Factor in Ultrasonic Assisted Gravity Drainage Process

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نویسندگان:

Behnam Keshavarzi - *Department of Chemical and Petroleum Engineering, Sharif University of Technology, Tehran, Iran*

Mohammad Javad Shojaei - *Department of Chemical and Petroleum Engineering, Sharif University of Technology, Tehran, Iran*

Mohammad Hossein Ghazanfari - *Department of Chemical and Petroleum Engineering, Sharif University of Technology, Tehran, Iran*

Cyrus Ghotbi - *Department of Chemical and Petroleum Engineering, Sharif University of Technology, Tehran, Iran*

خلاصه مقاله:

It has been proved that ultrasonic energy can considerably increase the amount of oil recovery in an immiscible displacement process. Although many studies have been performed on investigating the roles of ultrasonic waves, based on the best of our knowledge, little attention has been paid to evaluate wave attenuation parameter, which is an important parameter in the determination of the energy delivered to the porous medium. In this study, free fall gravity drainage process is investigated in a glass bead porous medium. Kerosene and Dorud crude oil are used as the wetting phases and air is used as the non-wetting phase. A piston-like displacement model with considering constant capillary pressure and applying Corey type approximation for relative permeabilities of both wetting and non-wetting phases is applied. A pressure term is considered to describe the presence of ultrasonic waves and the attenuation factor of ultrasonic waves is calculated by evaluating the value of external pressure applied to enhance the flow using the history matching of the data in the presence and absence of ultrasonic waves. The results introduce the attenuation factor as an important parameter in the process of ultrasonic assisted gravity drainage. The results show that only a low percentage of the ultrasonic energy (5.8% for Dorud crude oil and 3.3% for kerosene) is delivered to the flow of the fluid; however, a high increase in oil recovery enhancement (15% for Dorud crude oil and 12% for Kerosene) is observed in the experiments. This proves that the ultrasonic waves, even when the contribution is not substantial, can be a significantly efficient method for flow enhancement.

کلمات کلیدی:

Ultrasonic Waves, Gravity Drainage, Attenuation Factor, Glass Bead Pack

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