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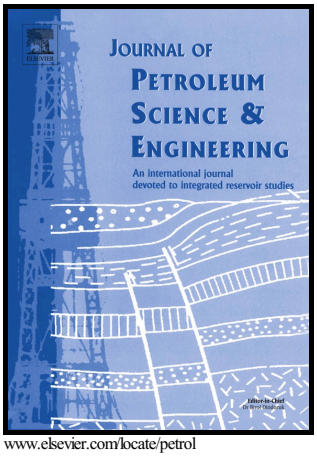

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Viscoelastic surfactants for diversion control in oil recovery

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ABSTRACT

Hydrocarbon recovery is significantly improved in heterogeneous systems by injecting viscoelastic surfactant solutions. These solutions retard the effect of preferential flow through so called 'thief zones' (high permeability regions). The viscoelastic fluid passively increases flow resistance in regions of high permeability thereby partially blocking thief-zones. The low permeability volume paths in these heterogeneous reservoirs are swept more efficiently since less of the injected flooding fluid is lost. The produced water cut is significantly reduced which increases the overall effectiveness of the recovery process . The solutions we used are self-regulating, making them universally applicable without extensive knowledge of the reservoir properties.

1. INTRODUCTION

Traditional oil recovery methods typically only recover about a third of the original oil in place (OOIP) from a reservoir (Al-Mjeni et al., 2011). This is generally done via water-flooding, where water is injected into a reservoir which drives the oil towards a production well. There are four restrictions to the recovery efficiency by water injection displacement. On a microscopic level, differential wetting effects affect recovery – this is addressed by classical EOR (enhanced oil recovery methods). Secondly, viscous fingering arises from viscosity differences between injected and displaced fluid – even when no porous medium is present. The main macroscopic effect however is permeability variations within the reservoir. These can arise either from