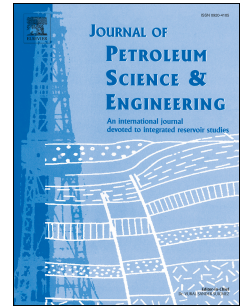


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Mechanical behavior of casing crossing slip formation in waterflooding oilfields

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1 Mechanical behavior of casing crossing slip formation 2 in waterflooding oilfields

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11 **Abstract:** The failure rate of casings in waterflooding oilfields is high. Casing
12 failure reduces the longevity of wells and economic benefit of oilfields. Based
13 on logging interpretation and statistical analysis, formation slippage is
14 identified to be the dominated cause of casing failure. A finite element model
15 (FEM) of well crossing slip formation is established and validated by the
16 experimental data. By adopting the FEM, nonlinear mechanical behavior of
17 casing crossing slip formation is analyzed. Results indicate that there is an
18 approximate sinusoidal relationship between the deflection of casing and the
19 distance from slip plane. The peak deflections of casing are slightly smaller
20 than the displacements of slip formations due to its high flexural rigidity. Stress
21 concentration occurs at the places those are ± 0.5 m from the slip plane. The
22 places of the peak Mises stress are closer than those of the peak deflection.
23 The predicted casing radii and integrity status are consistent with the logging
24 data. The findings can provide a reference for casing design in waterflooding
25 oilfields.

26

27 **Keywords:** Well integrity; Casing failure; Waterflooding; Formation slippage

28

29 1. Introduction

30 Casing integrity is significant to maintain and improve the production
31 performances of oilfields. It affects the longevity of wells and the economic
32 benefit of oilfields. For a long time, casing failure occurs frequently in
33 waterflooding oilfields. For example, the 72% of production wells and 63% of
34 injection wells presented casing failure in the block VI of Casabe oilfield
35 (Olarde et al., 2009). More data of casing failure rate in waterflooding oilfields
36 can be seen in Fig. 1.

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