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LUBRICATION AND DRAG REDUCE OF COILED TUBING IN HOLE CLEANING

TRACK OR CATEGORY

Ceramics and Composites 2615180

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INTRODUCTION

For the high demand of oil and gas resources, horizontal and highly deviated wells have been widely applied for high production efficiency [1-3]. Particles deposition easily occurs in the horizontal section during the exploitation process for low formation strength and fracturing particles deposition and accumulation, due to the particle gravity is tangential to the flow direction in the horizontal section. The increasing amount of particles easily produces stationary deposited bed in horizontal well section [4], which leads a lot of problems, such as equipment failure, pressure drops and production decline. Tools working for horizontal well cleaning operations with coiled tubing driving has been extensively used during the exploitation process [5-8]. In order to better understand the interaction mechanism of coiled tube working during cleaning in horizontal well section. Friction and wear behaviors of coiled tube counter with N80 casing during sand cleanout process were investigated using a basic friction test device Rtec (US) with self made chucking tool. Coiled tube-casing friction and wear tests were conducted to simulate the reciprocating lift operation of the downhole tools. Cleaning fluid of guar gum solution circulating with different concentrations, 1‰, 5‰, and 9‰ (wt). Influences of load, rotating speed and washing fluid concentration were investigated.

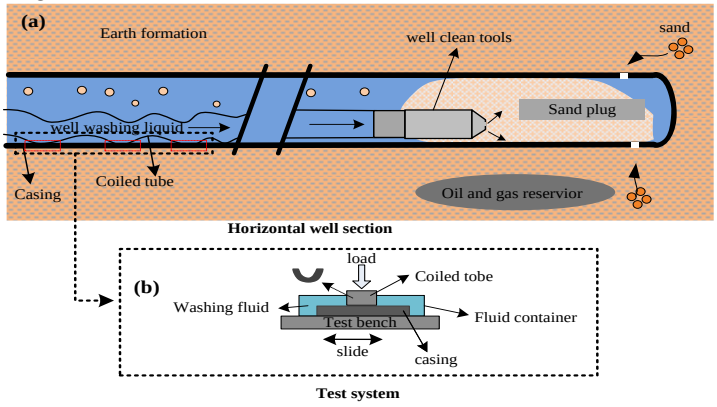

Fig. 1 (a) sand removal in horizontal well section; (b) coil tube CT90 reciprocate friction with N80 casing with different conditions

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1. Test materials

Problems in horizontal well is an urgent problem facing in current oil and gas exploitation, and therefore coiled tube driving material friction and wear should consider the working condition, the friction

mechanism and service life of coiled tube are rarely at present stage, this paper, coiled tube CT90 and N80 casing are used in this research.

2.Friction test

The friction test experiments conducted in this paper shown in Figure 1(b), the test system mainly contains three main components, the force test part, the reciprocate movement of the lower sample, the loading part. Computer is the centre part. Gum guar fluid are widely used as the washing fluid for deposited particles transport, which was applied from Sigma-Aldrich for R&D use. Different frequencies were used to are used to simulate coiled tube working during the tool forward and backward movement in the blocking condition.

3. Testing parameters

A series of experimental tests were conducted to investigate the influencing factors using the test rig in figure 2, such as guar gum solution concentration, 0.001, 0.005, 0.009, normal load10n, 20n, 40n, and rotate frequency0.1hz 0.5hz 1hz, reciprocate stroke 10mm.

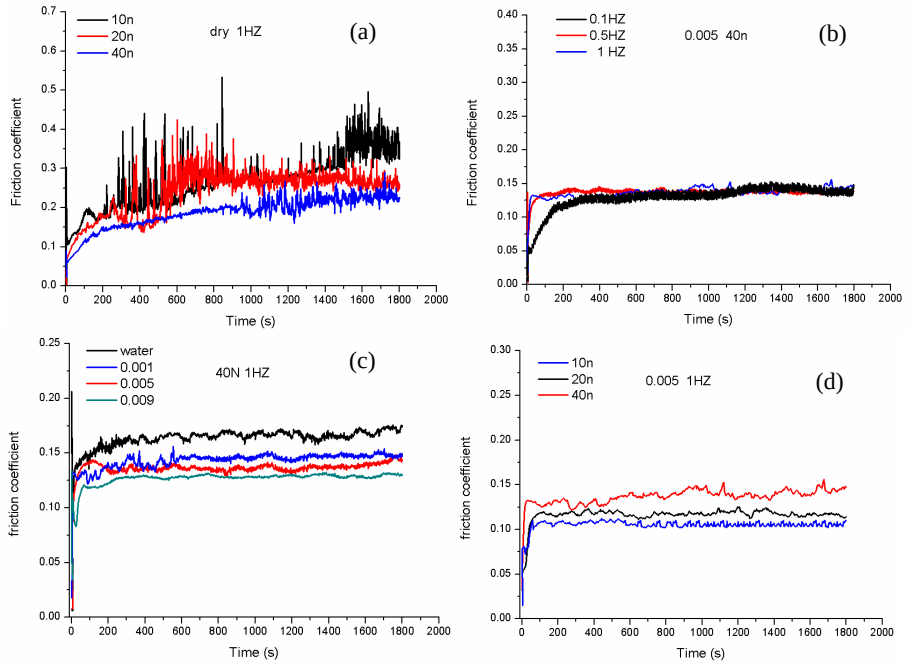

Fig. 2 Friction coefficientat coiled tube-casing contact withdifferent condition:(a) load of 10n 20n 40n under 1hz frequency in dry condition; (b) 0.1, 0.5, 1hz frequency load of 40n in 0.005 gum guar solution condition; (c)0.001, 0.005, 0.009 gum guar solution condition, load of 40n under 1hz frequency in water; (d) load of 10n, 20n, 40n, 1hz frequency in water, 0.005gum guar solution condition.

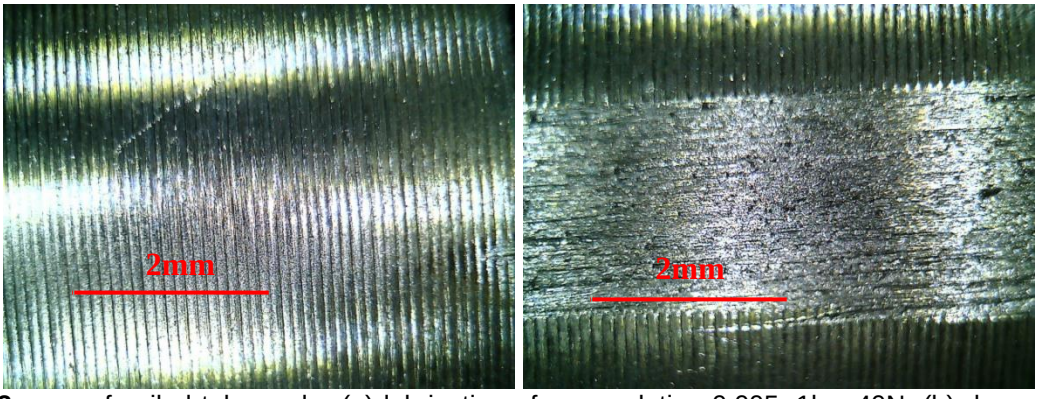

Fig. 3 wear of coiled tube under (a) lubrication of guar solution 0.005, 1hz, 40N, (b) dry condition, 1hz, 40N.

4. Results

The friction process at coiled tube-casing slide contact st different conditions are shown in figure 2, respectively. The friction process at coiled tube-casing dry slide contact is shown in figure 2(a), Dry slide process has a higher friction stage for the wear effect for line contact changing to plate-plate contact and the plowing effect between the two interface. From figure 2(b), the friction process under guar solution lubrication with the influence of reciprocating frequency is little. Meanwhile from the figure 2, the lubrication friction process is apparently stable, compared with the dry friction. Guar solution concentration helps reduce the friction between coiled tube and casing, shown in Figure 2(c). Under the guar solution lubrication, with load increasing, the friction drag is still increasing, but small. From figure 3, it can be clearly seen that with the guar lubrication, the coiled tube damage has been reduced obviously..

ACKNOWLEDGMENTS

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KEYWORDS

Coiled tube; Friction; Gum guar; Lubrication