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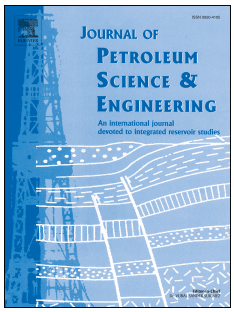

A novel vibration drilling tool used for reducing friction and improve the penetration rate of petroleum drilling

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A novel vibration drilling tool used for reducing friction and improve the penetration rate of petroleum drilling

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Abstract: A novel self-resonating oscillator which can be used for reducing the friction between drill-pipe and borehole wall and improving the rate of penetration is proposed. Several key issues of this tool are discussed in this paper, including the structure and principle of the modulating tool, the modulation mechanism of the vibration, the optimization method and the optimal structural parameters of the modulating tool. An engineering prototype is developed based on the above research works and site conditions. Field tests of the prototype are performed. The application effect is compared with actual drilling data of adjacent wells in the same formation and interval. The results are a good reference for the subsequent drilling.

Keywords: complex structural well; friction reduction by vibrating; enhancement in ROP; field tests

1. Introduction

Complex structures well technology, such as directional wells, horizontal wells and extended reach wells, has become the most effective means to exploit oil and gas resources. During the sliding drilling process in such wells, the drill-string does not rotate, which result in a sharp increase in friction between the drill-string and the borehole wall, so that the weight on bit cannot be effectively passed to the drill bit. The above phenomenon will not only reduce the rate of penetration (ROP) but also limit the extreme extension distance of the borehole. So the friction problem is one of the technologies which need to be overcome urgently [1-3].