The Optimal Control and Algorithm of the Horizontal Well's Trajectory with Deviation

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Abstract: In order to solve the optimization problem of designing the trajectory of three-dimensional horizontal well, we establish an optimal control model, in which the state equations are nonlinear, multi-stage, stochastic, ordinary differential ones. By integration of the differential equations, this model can be transcribed into nonlinear programming problem. We discuss here the necessary conditions under which a locally optimal solution exists and depends in a continuous way on the parameter (deviation). According to these properties, we propose an amendment of Hooke—Jeeves algorithm, work out relevant software and applied into practice. The numerical results illustrate the validity and efficiency of the proposed model and algorithm.

Key words: horizontal well; optimal control; nonlinear programming; Hooke—Jeeves algorithm