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Linearization Solution and Component Tracking of Natural Gas Pipeline Transient Simulation

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ABSTRACT

In present study, a fast simulation algorithm based on linearization is used to simulate the flow parameters of the natural gas pipeline under transient operating conditions, analyze the impact of natural gas components on the transient operation, and conduct the tracking calculation of natural gas components [1-3]. Under the condition that the simulation calculation accuracy is not affected, the first-order Taylor linearization expansion method is used to linearize the transient simulation model of natural gas pipeline, while the second-order implicit difference dispersion method is used to obtain the linearized discrete equations without initial value selection and multiple iterative solutions, thus greatly improving the simulation efficiency. In the same time layer, the fast simulation algorithm of transient linearization of natural gas pipeline, the convection equation of gas components and the gas physical property parameter model are coupled to realize the component tracking calculation of natural gas trunk pipeline. Through transient flow simulation and component tracking, the distribution of each gas component along the pipeline and the variation of gas physical properties are characterized, with the purpose of providing reference for the safe operation and accurate measurement of the natural gas pipeline.

KEYWORDS

Natural gas pipeline; linearization; implicit difference; component tracking; transient flow

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