THEORETICAL STUDY ON LEAKAGE OF URBAN MEDIUM-PRESSURE NATURAL GAS PIPELINE

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Abstract:
With widespread deployment of the urban natural gas industry, the energy security is now becoming one of the priorities in practice. Gas leakage may occur from the pipeline during the collection and transportation process. This article therefore presented a theoretical study on the urban natural gas pipeline leakage in order to provide the basic theory of the rescue policy making in emergent occasions. The investigation was undertaken through the fundamental analysis based on derivation of gas leakage models. The gas leakage model was applied to analyze the pressure, temperature and flow rate of gas leakage over time under both the steady-state and dynamic conditions. Two main impacting factors, pressure and hole size, were subsequently discussed. It is concluded that for the steady leakage the flow rate increases with the increase of pipeline pressure and hole size. And the distribution of pressure, temperature, density and velocity were calculated along the pipeline. For the unsteady leakage, the time of leakage is very short under different initial pressure and hole size, and the total leakage and average leakage rates were analyzed.

Keywords: Natural gas pipeline, Steady leakage models, Unsteady leakage model, Leakage flow rate, Leakage time

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