Analysis of Selected Thermodynamic Derivative Properties of Natural Gas Pipeline Flow Model

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The thermodynamic derivatives based on fundamentals thermodynamic space and physical parameters of natural gas influences other variables of pipeline systems such as pressure, temperature, velocity, density, gas compressibility, etc. These variables are crucial for gas pipeline system knowledge and its accurate operation. Fundamental parameters are derived such as Joule-Thomson (J-T) coefficient, isothermal throttling coefficient and isentropic coefficient. They influence gas flow when during the expansion of natural gas in the pipeline, the gas cools down due to the J-T effect and due to the interaction between pipeline system and its surroundings to the conditions at which gas is saturated by water vapour (dew point), and gas is not able to keep excess humidity and its condensation and gas hydrate formation will occur. The article deals with analyses of selected thermodynamic derivatives in the range of chosen temperatures and pressures and also non-isothermal steady-state flow model for pipeline is presented.

Keywords: gas pipeline, natural gas, thermodynamic properties

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