Gas-liquid two-phase flow behavior in terrain-inclined pipelines for gathering transport system of wet natural gas

Gas-liquid two-phase flow behavior in terrain-inclined pipelines for gathering transport system of wet natural gas

The Volume of Fluid method and Re-Normalisation Group (RNG) k-ε turbulence model were employed to predict the gas-liquid two-phase flow in a terrain-inclined pipeline with deposited liquids. The simulation was carried out in a 22.5 m terrain-inclined pipeline with a 150 mm internal diameter. The flow parameters were numerically analyzed in detail including the phase distribution in pipes, the velocity and pressure around the elbow, the liquid flow rate and liquid holdup in different cross-section and the volume of liquid outflow. The numerical results presented that a wave crest formed on the liquid level under the suction force which caused by the negative pressure around the elbow, and then it touched to the top of the pipe. When the liquid blocked the pipe, the pressure drop between the upstream and downstream of the elbow increased with the increase of the gas velocity. At larger gas velocity, more liquid was carried out of the pipeline. The liquid periodically flowed and returned along the uphill section when the liquid was no longer flowing out of the pipeline.

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