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Experimental Stress Analysis on Pipeline in Condition of Frost Heave and Thaw Settlement

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Abstract : The safety of pipelines in the condition of frost heave or thaw settlement is necessarily evaluated. A full-scale experiment pipe with the typical structure configuration in station pipeline is constructed, the residual stress is tested with X-ray residual stress device, and the residual stress field of pipe is analyzed. The evolution of pipe strain with pressure in the scope of maximum allowable operation pressure (MAOP) is investigated by both strain gauge and X-ray methods. Load caused by frost heave or thaw settlement is simulated by two ways of lifting jack. The relation of maximum stress of pipe and clearances between supporter and pipe is studied in case of frost heave. The relation of maximum stress of pipe and maximum deformation of pipe on the ground is studied in case of thaw settlement. The study methods and results are valuable for safety assessment of station pipeline according to clearances or deformation in the condition of frost heave or thaw settlement.

Keywords : frost heave, pipeline, stress analysis, thaw settlement
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