MEASUREMENTS OF CURVATURE RADIUS AND BENDING STRESSES IN PIPELINES

Background
One of the main problems of trunk oil and gas pipelines is to control the stress-strain state of pipeline. Hoop stresses could be easily determined by operating pressure, while the longitudinal stresses should be calculated as a sum of axial stress and bending stress. Bending stresses, which could cause the pipeline corrugation, could be determined by pipeline’s bending moment and curvature radius, furthermore they are in dependence, and so if you know the pipeline curvature radius, the bending stresses could be calculated as well. That is why this article is related to the measurements of curvature radius of pipelines.

Aims and Objectives
To improve the experimental and calculation methods of pipeline’s curvature radius and bending stresses assessment.

Methods
Research is based on the theory of elasticity, material strength, and theoretical mechanics. Experimental and calculation methods were used.

Results
The authors analyzed the main reasons of inaccuracy during the curvature radius calculations, offered the improved formulas, and developed the new device – curvature arm measuring set, which allows to measure the curvature radius accurately, using one of pipeline’s generatrices. Finally, a new method to calculate the bending stresses using well logging data were developed accounting the calculation accuracy.

Key words: pipeline, stress, curvature radius, curvature arm measuring set, final elements method, well logging data

References
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