ON THE EFFECT OF MULTI-TUBE DIFFERENTIAL MANOMETER AND ITS PRACTICAL IMPORTANCE UNDER PIPELINE FILLING WITH STABLE LIQUID (Algorithm and features of technological procedures during pipeline putting in operation)

Background
It is assumed that during pumping of oil and petroleum products vapor-gas phase is formed in the pipeline at operating pressure lowered to the saturated vapor pressure. However, in relief lines the flow continuity at certain speeds of pumping is disturbed in the high points of the route profile, which result in incomplete filling with liquid of the beginning of descending pipeline portion after the saddle point, and the remainder of the descending portion (directly after the saddle point) will be occupied by the gas-vapor mixture. The resulting gas locks in the descending pipeline sections give rise to so-called effect of multitube differential manometer, when additional hydraulic resistance develops due to the presence of gas locks and their «constraint» in the pipeline. The practical significance of this phenomenon in filling in the pipeline with stable liquid is assessed.

Aims and Objectives
To assess practical significance of the considered effect under relief pipeline filling in.

Methods
Theoretical study, mathematical modeling.

Results
The algorithm of techniques is offered for the initial filling in of relief pipeline prior to its putting in operation. It is stated that under realized filling rates the gas locks cannot be removed from descending sections of the pipeline without using special devices.

Conclusion
The results can be used to improve methods for calculating the water hammer in the pipelines laid on the rugged terrain, as well as to select algorithm of the initial filling procedure prior to putting these pipelines in operation.

Key words: main relief pipeline, transport of stable liquid, disturbance of flow continuity, features of water hammer calculation

References


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