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MATHEMATICAL MODELING OF THE STRESS-STRAIN STATE OF THE OFFSHORE CONCRETED PIPELINE

Background
Description of the known methods of calculating strength and stability of the offshore concreted pipelines, and the rationale of the necessity to consider the impact of loads that cause buckling of the pipeline are given.

Aims and Objectives
To construct a mathematical model of the stress-strain state (SSS) of the underwater beam crossing and the section of the offshore pipeline made of concreted pipes. The considered pipeline section is deformed under its own weight with the product, operational loads and buoyancy force of water.

Methods
Problems are solved by creating mathematical models based on the theory of stress-strain state of core systems, calculations for specified cases, and data analysis. The presented calculations were performed using the «MathCad» software package. Various options of setting tasks, taking into account the operational parameters and design features of the pipeline have been considered. Differential equations for these options, setting goals, and solutions of these equations are presented.

Results
Calculations and analysis of strength and stability characteristics of the considered part of the offshore pipeline composed of concreted pipes showed that neglecting the impact of thermal stress and internal pressure on the bending of the pipeline may lead to a significant underestimation of the maximum values of the characteristics of stress-strain state, close to the critical values.

Key words: offshore pipeline, submarine pipeline, concreted pipeline, bending of pipeline, stability, stress-strain state

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