MECHANICS

UDC 536.22

THE EMERGENCE OF THE ROTATIONAL FLOW IN THE LAYERS OF MARANGONI

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This article examined the effect of the rotational motion of a fluid in a thin boundary layer near the free surface at the impact of this surface longitudinal temperature gradient. We investigated two cases of stationary axisymmetric thermocapillary flow, namely the radial temperature gradient along the free surface is positive in the first case, and negative in the second case. Rotational fluid flow arises only in the boundary layer in the first case. Rotation of the fluid is absent in the region of the boundary layer. The rotational effect is not observed in the second case.

Keywords: *free surface, boundary layer, effect of Marangoni, rotation, small viscosity, thermal conductivity.*

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УДК 539.3

FINITE ELEMENT MODELLING OF PIPELINE WITH VOLUMETRIC DEFECT

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The nonlinear static problem of the modeling of pipeline with volumetric surface defects, under inner pressure was considered. Using the finite element approach unknown displacements and stresses fields were constructed. The simulation was made using the appropriate model of plasticity for the pipeline material. The level of stresses is analyzed for various zones of construction. As a material for pipeline was used the most popular alloy that used for production of oil pipelines. The influence of defect geometry on the stress-strain behavior of the pipeline system was investigated. The results allowing to decrease the cost for creation of testing specimens were obtained.

Keywords: *pipeline, defect, plasticity.*

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УДК 532.582

DYNAMIC INTERACTION OF CYLINDRICAL SHELL WITH FLUID FLOW

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Problem of the interaction of elastic circular cylindrical shell of finite length with a flow of ideal incompressible fluid in a linear formulation was considered. Shell makes forced axisymmetric harmonic bending vibrations causing progressing longitudinal waves. Using the method of integral transforms the problem was reduced to solving a system of integral and differential equations. Approximate solution of these equations is searched in the form of expansions of the basic unknown functions in the functional series on orthogonal polynomials. Both equations are reduced to solving two systems of linear algebraic equations for the coefficients of these expansions. The results of the numerical implementation of the algorithm for solving the problem presented in the form of graphs.

Keywords: *elastic circular cylindrical shell, flow of an ideal incompressible fluid, shell interaction with the liquid.*

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