MECHANICS

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IDENTIFYING THE INHOMOGENEOUS PROPERTIES OF AN ELASTIC LAYER USING THE METHOD OF QUASILINEARIZATION

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The possibility of application of a quasilinearization method for the inverse coefficient problems of the theory of elasticity on a model problem of the isotropic inhomogeneously elastic layer properties identification (in the class of quadratic functions) according to acoustic sounding are investigated. A computer experiment is performed for different inhomogeneity layers, the effective frequency sounding regions for identification are revealed, and various aspects of numerical realization are discussed.

Keywords: *inhomogeneity, identification, isotropy, layered medium, elasticity, method of quasilinearization.*

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OPTIMIZATION OF GEOMETRY OF THE WIND TURBINE BLADE WORKING IN A TUNNEL OF CONSTANT DIAMETER

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We propose a new method to find optimal geometry of the wind turbine blade, working in a tunnel of constant diameter. The blade is a thin twisted plate with a varying chord. The cross-sections may differ from each other by the angle of setting and the width. The attack angle is defined by the angle of setting, and by the angle which depends upon the wind speed. The fluid is accepted incompressible and inviscid. To solve the problem, we accept the hypothesis of plane sections. Under such hypotheses there is developed an integral equation, and a certain numerical method to solve this equation is proposed. Besides, there is constructed a genetic algorithm, which provides optimization of the blade. Some examples demonstrate the obtained numerical solutions.

Keywords: *wind energy, wind turbine, boundary integral equations, genetic algorithm, optimization, wind turbine blade.*

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