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SOLUTION TO THE TASK OF ELASTIC AXIAL COMPRESSION–TENSION OF THE COMPOSITE MULTILAYERED CYLINDRICAL BEAM

S. B. Koval'chuk,[a,1] A. V. Gorik,[a] A. N. Pavlikov,[b] and A. V. Antonets[a]

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The authors present an accurate solution to the task of elastic axial compression (tension) of the multilayered cylindrical beam with axial orthotropic layers surrounding a central core. The description of the geometry and structural framework of the beam requires the employment of the circular cylindrical system of coordinates where the mechanical characteristics of its inhomogeneous materials serve as the functions of the only variable. The task is solved via direct integration of the entire system of equations of the theory of elasticity within the selected system of coordinates upon the condition of rigid contact at the interfaces of the layers. The analytical relations for all the components of the features of the stress-strain state are obtained, their application is illustrated by the results of the solution to the test task of compression of the four-layered beam with the isotropic core.

Keywords: multilayered beam, orthotropic layer, axial elastic compression–tension, stress-strain state, displacement.

Introduction.

[a]Poltava State Agrarian Academy, Poltava, Ukraine ([1]stanislav.kovalchuk@pdaa.edu.ua), [b]Yuriy Kondratyuk Poltava National Technical University, Poltava, Ukraine. Translated from Problemy Prochnosti, No. 2, pp. 83 – 96, March – April, 2019. Original article submitted April 12, 2018.

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