Nikabadze, M.; Ulukhanyan, A.
On the theory of multilayer thin bodies. (English)
Lobachevskii J. Math. 42, No. 8, 1900-1911 (2021)

Summary: Using the basic recurrence formulas for Chebyshev polynomials of the second kind, the several additional relationships have been obtained which play an important role in the construction of various variants of the theory of thin bodies. The moments of the tensor functions, as well as the moments of their derivatives and the moments of the repeated derivatives are determined, too. The moments of the $k$th order of some expressions with respect to Chebyshev polynomials are found. Representations of the equations of motion with respect to the contravariant components of the stress and couple-stress tensors, the heat flow equation, constitutive relations of the micropolar theory, and the Fourier heat conduction law of the $s$th order approximation are given. From them it is easy to get the corresponding relations in the moments with respect to the systems of Chebyshev and Legendre polynomials. As a particular case, the zero and first approximations motion equations in moments with respect to the contravariant components of the stress and couple-stress tensors are written out, and also the systems of equations in the displacements of the zero and first approximations in moments for non isothermal processes for any anisotropic material are given.

MSC:
74K99 Thin bodies, structures
74E30 Composite and mixture properties
74F05 Thermal effects in solid mechanics
74S99 Numerical and other methods in solid mechanics

Keywords:
micropolar material; Legendre polynomial; Chebyshev polynomial; stress tensor; tensor-block matrix operator; problem decomposition; Fourier heat conduction law

Full Text: DOI

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