Dynamic analogues of Green and Gauss's formulas for unsteady dynamics of anisotropic elastic medium at antiplane deformation

Gulmira K. ZAKIR'YANOVA [1]

[1] *Institute of Mathematics and Mathematical Modeling, Kazakhstan*
E-mail: gulmzak@mail.ru

Abstract: The paper is devoted to the solution of non-stationary boundary value problems (BVP) for an anisotropic elastic medium at antiplane deformation. Wave propagation in continuous medium is described, as a rule, by hyperbolic equations and systems [1, 2]. In this case we have hyperbolic equation of second order with constant coefficients

$$(a_{ij}\partial_i\partial_j - \rho\partial_t^2)u(x,t) = G(x,t), \;\; i,j = \overline{1,N}$$

where $a_{ij} \geq \lambda\|\xi\|$, $\lambda = const > 0$, $\rho = const$, G is regular function. For the solution of the non-stationary BVP for this equation the Method of Generalized Functions (MGF) [3] is used. This method allows the original BVP to lead to the solution of the equations in the space of generalized functions with a certain right-hand side of the class of singular generalized functions such as simple and double layers and use the properties of fundamental solutions of equations for the construction of their generalized solutions.

Here MGF is used for investigation of unsteady dynamics of anisotropic elastic medium at antiplane deformation. The statement of two initial boundary problems are given. Dynamic analogues of Green and Gauss's formulas constructed [4] and their integral representations obtained.

Keywords: hyperbolic equation, boundary value problem, generalized solutions, elastic medium

2010 Mathematics Subject Classification: 35L15, 74J05

References

[1] L.A. Alexeyeva, Sh.A. Dildabayev, G.K. Zakiryanova, A.B. Zhanbyrbaev "Boundary Integral Equations Method in two-and three-dimensional problems of elastody-namics *Computational mechanic*. **18**:2. 147-157 (1996).

[2] L.A. Alexeyeva, G.K. Zakiryanova, "Generalized Solutions of InitialBoundary Value Problems for Second Order Hyperbolic Systems *Computational Mathematics and Mathematical Physics*. **51**:7. 11941207 (2011).

[3] L.A. Alexeyeva, "The generalized functions method in non-stationary boundary value problems for wave equation *Mathematical Journal*. **6**:1. 16–32 (2006).

[4] Zakiryanova, G.K., "Dynamic analogies of Green's and Gauss formula for hyperbolic equations", *Mathematical Journal*,Vol. 10, No.3, pp. 67-74, 2010.