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TAKING CYCLICAL SYMMETRY INTO ACCOUNT IN ANALYTICAL DESCRIPTION OF LOCI BY THE R-FUNCTIONS METHOD

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Wide range of boundary value problems for mathematical physics are connected with computation of physical-mechanical fields in domains with some type of symmetry. Use of the R-functions method for these problems consists usually in determination of field in domain of translation element. However, such way for taking symmetry into account is not always possible. Since it is connected with presence of geometrical symmetry and corresponding field symmetry. Otherwise, a number of R-operations and basic domains participated in forming of symmetry domain are essentially increased. Therefore it leads to increase of computation costs. Thus elaborating need of an universal method for construction of boundary equations for complicate loci with symmetry in the frame of the R-functions method is appeared [1]. Solution of this problem will allow to avoid indicated difficulties and, moreover, to increase accuracy and automate the solution process of boundary value problem with the R-functions method.

The paper is devoted to development of the R-functions method for construction a normalized loci equations of domains with cyclical symmetry [2]. Theorems for analytical description of symmetry loci in case the translation element possess X- and Y- axis symmetry are formulated and proved. In particular, take a place

Theorem 1. *If translation locus* $\Sigma_0 = [\sigma_0(x - r_0, y) \geq 0], \sigma_0(x, y) \in C^n(\Omega)$, *has symmetry along an X-axis and can be placed inside a sector* $-\alpha \leq \theta \leq \alpha, 0 < \alpha < \frac{\pi}{m}$, *and loci* Σ_i *are received by turning locus* Σ_0 *around origin of coordinates on corners* $\frac{2\pi i}{m}, \left(i = \overline{0, m-1}\right)$, *then* $\omega(x, y) \equiv \sigma_0(\rho\cos\mu_n(\theta, m) - r_0, \rho\sin\mu_n(\theta, m)) = 0$ *is boundary equation* $\partial\Omega$ *of locus* $\Omega = \bigcup_{i=1}^{m-1} \Sigma_i$.

For all considered cases contour line pictures of functions $\omega(x, y)$ are shown. For these purposes the system of engineering calculations Polye-RL developed in the department of Applied mathematics and computations methods is used.

REFERENCES

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