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On Estimate of the Gradient of the Hypersingular Integral Equation Solution with use of Some Numerical Scheme

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Аннотация:

The Neumann boundary value problem for the Laplace equation arises in the theoretical aerodynamic. We consider the problem in a domain, whose boundary is a smooth closed surface. One of the methods of solving is to reduce the boundary value problem to the linear hypersingular integral equation written out on the surface under consideration. For the integral operator in that equation, we suggest quadrature formulas like the method of vortical frames with a regularization. The formula provides approximation of the unknown function and it's surface gradient on the entire surface for the use of a nonstructured partition. We construct a numerical scheme for the integral equation on the basis of suggested quadrature formulas. This scheme provides the uniform convergence of numerical solutions to the exact solution of the hypersingular integral equation as well as the uniform convergence of finite difference gradient of numerical solution to the exact gradient of unknown function.

Ключевые слова:

Singular integral equation; boundary value problem; finite difference gradient; vortex method