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THE NUMERICAL SOLUTION OF THE GENERALIZED AIRFOIL EQUATION

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1. Introduction. Singular integral equations on an interval and their numerical solution have been studied by many authors [**3, 5, 6, 7, 11, 12, 13, 14, 16, 18, 19, 23, 25, 32**] in the recent two decades. There the case when the integral operator contains an additional term with a weakly singular kernel of the type $\log|y-x|$ possesses special importance for applications in aerodynamics as well as in the diffraction theory and in the two-dimensional elasticity theory [**9, 11, 12, 14, 33**].

In the present paper we will study a quadrature method for the equation

(1.1)
$$\frac{1}{\pi}\int_{-1}^{1}\frac{v(y)\,dy}{y-x}-\frac{\nu}{\pi}\int_{-1}^{1}\ln|y-x|v(y)\,dy+\frac{1}{\pi}\int_{-1}^{1}k(x,y)v(y)\,dy=f(x),$$

$x\in(-1,1)$. Here f and k are given Hölder-continuous functions, ν is a complex number, and v is the sought function. The paper [**12**] elaborates a collocation method, the collocation points of which are just the zeros of certain orthogonal polynomials (Jacobi polynomials). Furthermore, the approximate solutions are sought in the form of linear combinations of other Jacobi polynomials, multiplied by the corresponding weight. The analytical treatment of [**16, 25**] for the operator

$$(1.2)\qquad cI+dS_o,\quad S_ov(x)=\frac{1}{\pi}\int_{-1}^{1}\frac{v(y)}{y-x}\,dy,\quad x\in(-1,1),$$

with Hölder-continuous coefficients c and d, where the action of the operator $cI+dS_o$ is described by an invariance relation between certain orthogonal polynomials, suggests that Golberg and Fromme's method [**12**] is a very natural one and gives cause to expect reliable results. Nevertheless, a disadvantage of this method consists of the fact that

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