A. Dzhishkariani

A. Razmadze Mathematical Institute, Georgian Academy of Sciences
Tbilisi, Georgia

STABILITY OF THE PROJECTION-ITERATIVE METHOD FOR ONE CLASS OF SINGULAR INTEGRAL EQUATIONS

The singular integral equation

$$(a + bS + K)\varphi = f \tag{1}$$

is considered, where S is the singular integral operator

$$S\varphi \equiv \frac{1}{n} \int\limits_{-1}^{1} \frac{\varphi(t)}{t-x}\, dt, \quad -1 < x < 1,$$

K is the Fredholm integral operator, a and b are the real constants, $a^2 + b^2 = 1$.

The problem on an approximate solution of equation (1) has been considered by many authors from Georgia, from the Republics of the Former Soviet Union, as well as from the USA, Germany and Greece.

Equation (1) is studied in the weight spaces; we consider three values of the index $\varkappa = 1, -1, 0$.

For $\varkappa = 1$, the additional condition

$$\int\limits_{-1}^{1} \varphi(t)\, dt = p \tag{2}$$

is prescribed, where p is the given real number.

For $\varkappa = -1$, the scalar product in the corresponding weight space $L_2\rho[-1, 1]$ is equal to zero

$$[K\varphi - f, 1] = 0, \tag{3}$$

where φ is the solution of equation (1).

For $\varkappa = 0$, the uniform equations $(a + bS)u = 0$ and $(a + bS)^* u = 0$ have only trivial solution $u = 0$ in the weight space.

D. Porter and D. Stirling proposed (IMA J. Numer. Analysis 13, 1993) the projection-iterative scheme for the second kind equation

$$(I + T)u = f,$$

where T is the completely continuous operator.

In my report the results of investigation of stability of the projection-iterative scheme for equation (1) will be stated.