APPLICATION OF SINGULAR INTEGRAL EQUATIONS IN SOLVING SOMEPROBLEMS OF THE THEORY OF THERMAL CONDUCTIVITY

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It has been shown [1, 2] that a lot of mixed plane problems can be reduced to a discrete Riemann problem of a form

$$n\Phi_{n+} = -\operatorname{sgn}\left(n+\frac{1}{2}\right)\Phi_{n-} + \Gamma_n\Phi_{n-} + nF_{n-}, \quad n \in \mathrm{Z}-\{0\},$$

where Φ_{n-} are the Fourier components of the required unbounded extension $\varphi_{-}(x)$ on Δ_1 and Φ_{n+} are those of $\varphi_{+}(x)$ the extensionon $\Delta_2 = [-\pi, \pi]/\Delta_1$. The equation has been reduced to the singular integral equation.

The point of departure is the heat equation for a cylinder with the mixed boundary conditions

$$T(1,\theta,t) = e^{-i\omega t} f(0), \text{ if } \theta \in \Delta_1, \ \frac{\partial T(1,\theta,t)}{\partial r} = 0, \text{ if } \theta \in \Delta_2, \ |T(r,\theta,t)| < \infty.$$

On reducing the problem to the Hilbert-type singular integral equation we get the approximate solution. On choosing the number N we obtain the approximate solution of the problem up to any prescribed accuracy.

References

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