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8. Analysis

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On Solvability theory of Hilbert boundary value problem with a Carleman shift.

We consider the following problem. Find a function $\Phi^+(z)$ analytic in the circle $|z| < 1$ satisfying the condition

$$Re\{A(t)\Phi^+(t) + B(t)\Phi^+(\alpha(t))\} = h(t) \text{ on } |t| = 1, (1)$$

where $A, B, h \in H_\mu(\Gamma)$ (Hólder class), $\alpha(t)$ is a linear fractional diffeomorphism of $|t| = 1$ onto itself preserving ou changing the orientation on $|t| = 1$ and satisfying the Carleman condition $\alpha(\alpha(t)) \equiv t$. The numbers of linear independent solutions and solvability conditions of problem (1) are calculated, and the very solutions are constructed in the terms of a factorization of (2×2) - matrix function determined by coefficients A, B. The particular cases are analysed when this factorization is realized effectively.

Reference: G. S. Litvinchuk, Boundary value problems and singular integral operators with shift, Nauka, Moscow, 1977 (in Russian), pp. 1 - 448. Chinese transl. : Beijing, 1982.