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8. Analysis

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Spitkovsky, Ilya, The College of William & Mary, USA

Almost periodic factorization and its applications

We consider an almost periodic analogue of the Wiener-Hopf factorization, that is, possible representations of $n \times n$ matrix functions G in the form

$$G(t) = G_+(t)\Lambda(t)G_-(t), \qquad t \in \mathbb{R}, \tag{1}$$

where $G_\pm$ are almost periodic, analytic and invertible in the upper/lower half plane, $\Lambda(t) = \operatorname{diag}[e^{i\lambda_1 t}, \dots, e^{i\lambda_n t}]$, and $\lambda_1, \dots, \lambda_n \in \mathbb{R}$.

Existence criteria and explicit construction of the factorization (1) will be given, mostly for block triangular matrix functions

$$G(t) = \begin{bmatrix} e^{i\lambda t}I & 0 \\ f(t) & e^{-i\lambda t}I \end{bmatrix}. \tag{2}$$

Several applications of the factorization (1) for matrices (2) will be considered, including convolution integro-difference equations on finite intervals, Carathéodory-Toeplitz and Nehari problems for (matrix) functions of several variables, Sarason interpolation and (Toeplitz) corona problem for almost periodic matrix functions.