Estimation of periodically correlated sequences

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Abstract

The problem of optimal estimation of linear functionals

$$A\zeta = \sum_{j=0}^{\infty} a(j)\zeta(j) \quad \text{and} \quad A_N\zeta = \sum_{j=0}^{N} a(j)\zeta(j)$$

depending on unknown values of periodically correlated stochastic sequence $\zeta(n)$, based on observations of the sequence $\zeta(n) + \theta(n)$ for $n < 0$, where $\theta(n)$ is uncorrelated with $\zeta(n)$ periodically correlated sequence, is considered. This problem is called extrapolation of periodically correlated sequence. The interpolation and filtering problems for periodically correlated sequences are considered too. For these problems formulas for calculating mean square errors and spectral characteristics of optimal estimates of functionals are proposed in the case where spectral densities are exactly known. Formulas that determine least favorable spectral densities and minimax spectral characteristics are found for a number of sets of admissible spectral densities.

Maximum values of mean-square errors of optimal estimates of functionals $A\zeta$ and $A_N\zeta$ are determined for a certain class of periodically correlated sequences.