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Game theory and convex optimization methods in robust estimation

With the help of the traditional methods of extrapolation, interpolation and filtering of stochastic processes the spectral characteristic $h(f,g)$ and the mean square error $\Delta(f,g)$ of the optimal estimate of the transformation $A\xi$ of a stochastic process $\xi(k)$ from observations of the process $\xi(k)+\eta(k)$ can be found in the case where the spectral densities $f(\lambda)$ and $g(\lambda)$ of the processes $\xi(k)$ and $\eta(k)$ are known. In practice, however, problems of estimation arise where it is necessary to search the estimate which has the least value of the error for all densities from a certain class of possible spectral densities (see a survey by S. A. Kassam and H. V. Poor (1985)). The spectral characteristic of such an estimate is called *minimax-robust.* We apply convex optimization and game theory methods to determine the least favorable spectral densities and the minimax-robust spectral characteristics of the optimal estimates of the transformation $A\xi$.

Reference: S. A. Kassam, and H. V. Poor, Robust techniques for signal processing. A Survey, *Proc. IEEE.* **73** (1985), 433–481.