NEW INSIGHTS INTO THE STATISTICAL SIGNAL MODEL AND THE PERFORMANCE BOUNDS OF ACOUSTIC ECHO CONTROL (ThuAmPO2)

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Abstract :

The contribution of this paper is two−fold. At first, we introduce a modification of the linear statistical signal model in acoustic echo control. In contrast to the traditional approach, the acoustic echo path is characterized as a random process with statistical mean and covariance, while the echo path input is modeled as a deterministic signal. Based on the modified signal model, we then derive the linear MMSE estimator for the near−end speech components in the microphone signal. The result can be seen as a generalized Wiener filter that consists of an acoustic echo canceler and a postfilter for residual echo suppression. The presented theory entails several fundamental advantages: a) the new signal model better matches the practical applications of acoustic echo control, b) it proves the principal coexistence of echo canceler and postfilter in hands−free communication systems, c) the generalized Wiener solution simplifies the realization of acoustic echo controllers, and d) we obtain a better insight into the performance bounds of acoustic echo control.

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