# The Role of Orthogonal Polynomials in Autoregressive Methods for Noise Cancellation in Acoustic Arrays

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Abstract:

The classical Wiener filter lies at the heart of many engineering problems involving the filtering of noise in digital signals. These problems can be interpreted in the context of linear prediction of sequences of random variables; the problem becomes that of minimizing the noise variance. The least mean square (LMS) algorithm is an approach to noise cancellation which is based on the Wiener filter and is used when the noise statistics are either unknown or changing over time, as is usually the case in applications. Given a sequence of random variables, there is an associated sequence of polynomials which are orthogonal with respect to distributions on the unit circle which are related to the noise process. In the above context, the polynomial coefficients of are equal to the weights
of a Wiener filter. We describe this connection and state some results about the asymptotic behavior of the polynomials with respect to sequences of distributions.

KEY WORDS: Orthogonal polynomial, noise cancellation.

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