## SIGNAL-TO-NOISE RATIO OF THE POWER-LAW ENVELOPE DETECTOR BY THE USE OF HARMONIC OUTPUT COMPONENTS

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A general analysis of the effect of the power-law envelope detector by the use of harmonic output components on signal-to-noise ratio (SNR) is performed. By using multiplication and filtering, the additional zero-frequency components are obtained from harmonic output components of the power-law envelope detector. An general expression of the improvement factor on SNR is obtained which is applicable to non-Gaussian noise. It is found that the output SNR can be improved by using the additional zero-frequency components from the output harmonic components of the power-law envelope detector.

## OPTIMUM NEAR-FAR RESISTANCE OF LINEAR DETECTORS FOR CODE-DIVISION MULTIPLE-ACCESS CHANNELS

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In CDMA systems users are assigned signature waveforms which are known to the receiver, thereby permitting demodulation of the data streams upon observation of the sum of the transmitted signals imbedded in additive noise. Assuming white Gaussian background noise, we compare detectors by analyzing the rate of exponential decay of the bit-error-rate in the low background noise region. Of special interest is the *near-far resistance*, defined as the worst-case performance with respect to the received energies of the interfering users.

Conventional single-user detection has zero near-far resistance. In this paper we find a linear detector whose computational complexity grows only linearly with the number of users and whose near-far resistance is equal to that of the optimum multiuser detector for asynchronous Gaussian multiple-access channels. Also, we show how to find the optimum near-far resistance as a function of the signature waveform crosscorrelations. (This work was partially supported by the U.S. Army Research Office under contract DAAL03-87-K-0062.)