



OPTIMUM SPECTRAL SHAPING FOR DISCRETE MULTITONE DEMODULATION (WedPmPO1)

* **Author(s) :** Tomasz Twardowski (AGH University of Science and Technology, Poland)

* **Abstract :** In this paper the problem of optimum shape (frequency weighting) of signal and noise before discrete-multitone demodulation (DMT) is analysed. Such a weighting is usually possible to some extent with the time domain equalizer (TEQ). The optimality criterion applied is the total capacity over all frequency subchannels. Optimum weighting is shown to be the maximum of a nonlinear function of weights. The feasible approach to solving the problem is a nonlinear Newton-type search supported by analytic derivative of the criterion. However, a suboptimal easy to evaluate solution is proven to be noise whitening weighting which achieves optimality with negligible bias. This weighting is shown to compensate FFT noise spreading in various noise and SNR conditions. These results form a step towards fast design technique of TEQ equalizer with objectives of impulse response shortening and spectral shaping.