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John J. Benedetto, Alexander M. Powell and Ozgur Yilmaz* (oyilmaz@math.ubc.ca),
1984 Mathematics Road, Vancouver, BC V6T 1Z2, Canada. *Sigma-delta quantization of finite frames.*

A basic problem in signal processing, when analyzing a given signal of interest, is to obtain a digital representation that is suitable for storage, transmission, and recovery. A reasonable approach is to first decompose the signal as a sum of appropriate harmonics, where each harmonic has a real (or complex) coefficient. Next, one "quantizes" the coefficients, i.e., one replaces each coefficient by an element of a given finite set (e.g., $\{-1,1\}$). The problem of how to quantize a given expansion is non-trivial when the expansion is redundant.

In this talk, we shall consider redundant frame expansions, and show that Sigma-Delta modulators provide efficient quantization algorithms in the case of finite frame expansions in Euclidean space. In particular, we shall show that Sigma-Delta algorithms outperform PCM algorithms (the current state-of-the-art). We shall also address the problem of optimal quantization in the case of finite frames. (Received September 18, 2005)