

## Theory and Practice of Wavelets in Signal Processing

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**Abstract :** The methods of Fourier, Laplace, and Wavelet Transforms provide transfer functions and relationships between the input and the output signals in linear time invariant systems. This paper shows the equivalence among these three methods and in each case presenting an application of the appropriate (Fourier, Laplace or Wavelet) to the convolution theorem. In addition, it is shown that the same holds for a direct integration method. The Biorthogonal wavelets Bior3.5 and Bior3.9 are examined and the zeros distribution of their polynomials associated filters are located. This paper also presents the significance of utilizing wavelets as effective tools in processing speech signals for common multimedia applications in general, and for recognition and compression in particular. Theoretically and practically, wavelets have proved to be effective and competitive. The practical use of the Continuous Wavelet Transform (CWT) in processing and analysis of speech is then presented along with explanations of how the human ear can be thought of as a natural wavelet transformer of speech. This generates a variety of approaches for applying the (CWT) to many paradigms analysing speech, sound and music. For perception, the flexibility of implementation of this transform allows the construction of numerous scales and we include two of them. Results for speech recognition and speech compression are then included.

**Keywords :** continuous wavelet transform, biorthogonal wavelets, speech perception, recognition and compression

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