
**Abstract**

In this paper, a signal is shown to be uniquely represented by the magnitude of its short-time Fourier transform (STFT) under mild restrictions on the signal and the analysis window of the STFT. Furthermore, various algorithms are developed which reconstruct signal from appropriate samples of the STFT magnitude. Several of the algorithms can also be used to obtain signal estimates from the processed STFT magnitude, which generally does not have a valid short-time structure. These algorithms are successfully applied to the time-scale modification and noise reduction problems in speech processing. Finally, the results presented here have similar potential for other application areas, including those with multidimensional signals.