INTRODUCTION TO TIME-FREQUENCY SIGNAL PROCESSING: THEORY, ALGORITHMS AND APPLICATIONS

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Abstract

Time-frequency signal analysis and processing (TFSAP) deal with the analysis and processing of time-varying signals. Spectrum based technique based on the Fourier transform could not fully characterize these signals. By using time-frequency distribution (TFD), the resulting representation will be able to show the energy of the signal is distributed over the two-dimensional time-frequency space. Processing of the signal may then exploit features produces by the concentration of signal energy in two dimensions (time and frequency) instead of only one. The advantages of the time-frequency analysis have been demonstrated extensively in numerous engineering fields such as telecommunications, radar, sonar, vibration analysis, speech processing and medical diagnosis.