

A Review of Advanced Methods for Glottal Inverse Filtering

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Glottal inverse filtering is a technique used to derive the glottal waveform during voiced speech. Closed phase inverse filtering (CPIF) is a common approach for achieving this goal. During the closed phase there is no input to the vocal tract and hence the impulse response of the vocal tract can be determined through linear prediction. However, a number of problems are known to exist with the CPIF approach. This review paper briefly details the CPIF technique and highlights certain associated theoretical and methodological problems. An overview is then given of advanced methods for IF; pole-zero modelling, model based, adaptive, higher order statistics and cepstral approaches are examined. The advantages and disadvantages of these methods are highlighted.

In addition to developing an optimum glottal identification algorithm some remaining issues concerning glottal inverse filtering include: evaluating what is considered to be a good result; what characteristics are perceptually relevant?; what characteristics are physically relevant? parametrization of the glottal volume velocity and the voice source (derivative glottal volume velocity); source-tract interaction; secondary excitation; recording conditions; time-varying glottal open phase transfer function. These issues are reviewed in the current study and a guide to applying a successful inverse filtering strategy is presented.