



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

This thesis investigates and endorses a non-linear and non-stationary data analysis technique, called Empirical Mode Decomposition (EMD), as an alternative to the conventional methods of speech analysis. This thesis commences with a study of EMD as an adaptive AM-FM analysis technique, its characteristics, and its advanced variants used to curtail mode-mixing - an inherent but undesirable phenomenon specific to EMD. Based on this study, this thesis first proposes a modified EMD algorithm, denoted MEMD, which curtails mode-mixing, but at a much faster rate than the existing advanced variants. Thereafter, a study is done on the ability of EMD and its variants, in decomposing the speech signal into IMFs which represent its latent source and system characteristics. Following this study, this thesis proposes the application of EMD and its variants in two speech processing applications. Firstly, this thesis proposes a principle or framework to detect the Glottal Closure Instants (GCIs), of the speech signal, using its IMFs. The objective here is to provide an alternative to the state-of-the-art methods based on short-time Linear Prediction (LP) analysis, which is based on the source-filter theory. Secondly, this thesis investigates the capability of the IMFs of the speech signal, in capturing speaker-specific information, which is left untapped by the fixed Mel filterbank structure.