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IMF Mode Demixing in EMD for Jitter Analysis

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Highlights

- The problem of mode mixing in the EMD is addressed.
- Noise cancellation based on demixing of Intrinsic Mode Functions constructed by EMD is proposed.
- Application of the proposed method for jitter analysis is presented.

Abstract—We propose a novel noise cancellation method based on the scale-adaptive remixing and demixing of Intrinsic Mode Functions (IMFs) constructed using Empirical Mode Decomposition (EMD). The method addresses the problem of mode mixing in the EMD by performing IMF mode demixing using a heuristic algorithm that minimizes correlation between subsets of second order IMFs generated from partial sums of first order IMFs. An illustrative example using the proposed method for jitter analysis of a noisy random binary sequence is presented. The proposed approach allows achieving better denoising results (evaluated using correlation, Peak-to-Peak value and predictability with AR(4) model) than the classic first IMF discarding approach.

Keywords—digital signal processing; signal denoising; empirical mode decomposition; mode mixing; jitter analysis.

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