P. Mitra and P. C. Pandey, Enhancement of electrolaryngeal speech by spectral subtraction with minimum statistics-based noise estimation, J. Acoust. Soc. Amer., vol. 120(5), pp. 3039, 2006

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Abstract - **Transcervical electrolarynx is a vibrator held against the neck tissue by a laryngectomy patient to provide excitation to the vocal tract, as a substitute to that provided by glottal vibrations. The electrolaryngeal speech suffers from lack of voicing and pitch control, low-frequency deficiency, and presence of background noise, caused by leakage of acoustic energy from the vibrator and vibrator-tissue interface. Pitch-synchronous application of spectral subtraction has been used for reducing the self-leakage noise, with averaging-based noise estimation on an initial segment with closed lips. But, the leakage noise spectrum varies with speech production and vibrator orientation and pressure. A dynamic estimation of noise is carried out by using minimum statistics, with two-pitch period analysis frames and one period overlap. Minimum value of each spectral sample in a set of past frames is used for dynamically estimating the magnitude spectrum of noise. This is subtracted from the magnitude spectrum of noisy speech and the signal is reconstructed using the original phase spectrum. Smoothing of the estimated noise spectrum resulted in better noise cancellation. Quality of electrolaryngeal speech is further enhanced by spectral deficit compensation of the magnitude spectrum.**