

Darshana M. Kulkarni, Development of a cascade pole-zero speech synthesizer, M. Tech. Thesis, Department of Electrical Engineering, Indian Institute of Technology Bombay, 1992.

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**Abstract** - A software based synthesizer with flexibility for introducing controlled changes in the characteristics of the speech signal is a useful tool in testing and calibrating various sensory aids for the hearing impaired. Klatt synthesizer is a software synthesizer in which vowels are synthesized by employing a cascade model, and zeros in the spectra of the speech segments with frication are simulated by a bank of formant resonators connected in parallel with amplitude control for individual resonators. This project is aimed at developing a synthesizer as a modification to Klatt synthesizer, which uses a pole-zero cascade model of the vocal tract model of the vocal tract.

A software based pole-zero cascade synthesizer which uses a cascade model for synthesis of vowels and employs antiresonators to simulate zeros in the spectra of speech segments with frication, along with a program for graphical generation of the parameter tracks, has been developed.

The project also involved the development of software tool for speech analysis and display. Spectral analysis of digitized natural utterances was carried out to obtain parameter tracks for the testing of cascade pole-zero synthesizer for Hindi phonemes, and the approach can be extended to the other Indian languages.