Shailendra A. Chaferkar, Speech synthesis for the testing of sensory aids for the hearing impaired, M. Tech. Thesis, Department of Electrical Engineering, Indian Institute of Technology Bombay, 1990.

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*Abstract* – A software based speech synthesizer with flexibility for introducing controlled changes in the characteristics of speech signal, e.g., fundamental frequency, voicing and frication amplitudes, stress patterns, and formant frequencies and amplitudes etc, is a useful tool in testing and calibration of various sensory aids for hearing impaired. One such synthesizer, the Klatt synthesizer, uses an all-pole model to approximate the vocal tract: vowels are synthesized by employing a cascade model, where as fricatives are synthesized by using a parallel model. Here the anti-resonances in the spectra of fricatives are approximated by adjusting the amplitude controls of the resonators connected in parallel.

In this thesis, a software based speech synthesizer which uses a pole-zero cascade model for the vocal tract has been developed. The cascade model should provide a more natural representation of the vocal tract, and should be better for synthesis in Indian languages, where aspiration is a phonetic contrast feature among many stop and affricate consonants.

A program SPSYNTH has been developed, implementing the scheme of the all-pole cascade/parallel synthesis (of Klatt synthesizer), as well as the new scheme of pole-zero cascade synthesis. Parameter tracks can be specified graphically. The program also offers an in-built set of commonly occurring phonemes, for synthesizing longer speech sequences. This phoneme set can be appended by specifying parameter tracks for user-defined phonemes. This feature would be useful in synthesizing speech of different accents, or pathological disorders.

The program has been tested by generating sample speech segments extending up to three seconds, under informal listening tests.