



**BME/ME
Seminar**

Simulation of sentence-level speech production with kinematic models of the vocal folds and vocal tract

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**Tuesday, September 29, 2009
11:00am -12:00 pm
MRGN 121**

A challenge in developing models of speech production is choosing the appropriate level of simplification. In recent years there have been advances in finite-element modeling of soft tissue structures, muscle activation models, aerodynamic models, and low-dimensional or lumped-element models. Research in each of these areas has provided important knowledge about various aspects of the speech production process, but the computational complexity and relatively-unknown temporal patterns of the input parameters of these models typically limits their use to short time scales. This presentation will focus on using kinematic models of the vocal folds and vocal tract shape to generate speech at the level of syllables, words, and sentences. Specifically, the vibrating medial surface of the vocal folds is represented by a kinematic model which allows for direct time-dependent specification of fundamental frequency, amplitude of vibration, glottal geometry, and glottal symmetry. The vocal tract shape is also governed by a kinematic model, based on data collected with MRI and x-ray microbeam techniques, that allows for efficient specification of time-dependent cross-sectional area changes in an acoustic waveguide. When these models are coupled, the result is a basic simulation of the sound production process from which pressures and flows are generated. The components of the system will be presented and then used to demonstrate samples of simulated speech. [Work supported by NIH R01-DC04789]