PROJECT TITLE: Airway, Voice, Cardiovascular Research

Ephraim Gutmark  
CEAS  
799 Rhodes Hall  
ephraim.gutmark@uc.edu  
513 556 1227

Project Description

Mechanisms of voice production are not well understood. They involve interaction between flow and structural vibrations of the vocal folds within the larynx; this is the aeroelastic aspect of the mechanism. The interaction between the flow and vibrating folds modify the flow and produces highly vortical flow pattern. This flow includes organizes vortices and random turbulence generates sound via mechanisms described by aeroacoustic theory. The sound is amplified and filtered in the mouth cavity before exiting as voice. Our jet noise research described in section 1 above has many similarities to voice generation mechanisms. Our research investigates the relationship between the flow field and the noise produced by the jet and both experimental and computational tools are useful for the larynx applications. The voice research is a collaborative effort between our laboratory and the Otolaryngology Department at the UC School of Medicine. Our goal is to develop the physical understanding of voice production that will help in developing new medical treatment and surgical procedures for patients with voice pathologies.

In addition to voice research we are collaborating with the Pulmonary and ENT Departments of CCHMC (Cincinnati Children’s Hospital) in applying CFD to compute airway flow and pressure distribution for sleep apnea and airway reconstruction research.