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Physics-based analysis and control of human snoring[1] YASELLY SANCHEZ, JUNSHI WANG, PAN HAN, Univ of Virginia, JINXIANG XI, California Baptist University, HAIBO DONG, Univ of Virginia — In order to advance the understanding of biological fluid dynamics and its effects on the acoustics of human snoring, the study pursued a physics-based computational approach. From human magnetic resonance image (MRI) scans, the researchers were able to develop both anatomically and dynamically accurate airway-uvula models. With airways defined as rigid, and the uvula defined as flexible, computational models were created with various pharynx thickness and geometries. In order to determine vortex shedding with prescribed uvula movement, the uvula fluctuation was categorized by its specific parameters: magnitude, frequency, and phase lag. Uvula vibration modes were based on one oscillation, or one harmonic frequency, and pressure probes were located in seven different positions throughout the airway-uvula model. By taking fast Fourier transforms (FFT) from the pressure probe data, it was seen that four harmonics were created throughout the simulation within one oscillation of uvula movement. Of the four harmonics, there were two pressure probes which maintained high amplitudes and led the researcher to believe that different vortices formed with different snoring frequencies.

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