Snoring as Markers for Obstructive Sleep Apnea – A Computational Multiphysics Investigation

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Obstructive Sleep Apnea (OSA) influence daytime sleepiness and is linked with hypertension and cardiac problems. Diagnosis of obstructive sleep apnea involving sleep tests are expensive, cumbersome and not practical for large scale diagnosis. Therefore, this article presents a computational investigation of snoring as potential markers for identifying patients with obstructive sleep apnea. To that end, a coupling between the fluid and structural physics of a cantilevered plate inside an obstructed channel flow is undertaken, to idealize soft palate instability within an obstructed oropharynx. Unlike previous approach, a pressure-specified inlet and velocity-specified outlet boundary conditions in the channel are applied to closer replicate actual conditions. A parametric study on the effect of channel obstruction to cantilever plate instability suggest onset and variability in onset of snoring as potential markers to detect obstructive sleep apnea. This may be exploited for development of mass diagnosis of obstructive sleep apnea in the general population.

Keywords: Obstructive sleep apnea, Fluid-structure interaction, Snoring