

# **Computer-Aided-Diagnosis in Obstructive Apnea Syndrome by CFD Simulation**

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This research uses numerical simulation and image reconstruction to conduct the airflow model analysis of upper airway narrowing that causes obstructive apnea syndrome. The developed numerical simulation and image reconstruction technique facilitates to diagnose the severity of the illness.

From the simulation results and the actual respiratory conditions from nineteen cases including obstructive apnea patients and normal subjects, one can see that the obstructive apnea patients with narrowing pharynx and larger pressure difference on the larynx part subject to the difficulties in breathing. Meanwhile, the simulated respiratory pressure difference in normal subjects is relatively lower. This could help to distinguish the severity of illness for the normal subjects and the obstructive apnea patients. We proposed an image diagnostic platform for the apnea syndrome during sleep with a combination of numerical simulation and image processing to identify the relationship curve between the narrowing ratio and the pressure difference of these nineteen cases. The aim of this study is to provide the physicians the clinical diagnosis and surgical information from the numerical simulation and image to discuss the difference of the upper airway of these obstructive apnea syndrome patients before and after surgery and to find the root of the obstructive apnea syndrome. It also helps to judge the severity of illness promptly by the curve of narrowing ratio and pressure difference from these cases.

Keywords: Obstructive apnea syndrome, flow simulation

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