

## **Characteristic airflow patterns during inspiration and expiration: experimental and numerical investigation**

### **ABSTRACT**

A simplified experimental nasal model was designed and an experimental setup was developed to facilitate both inspiratory and expiratory flow measurements. Particle image velocimetry (PIV) and resistance measurements were conducted. The purpose of this work was primarily to demonstrate a simple way of carrying out experiments for a replica human nose in order to validate numerical studies. The characteristic recirculatory patterns observed explicitly as a consequence of inspiration and expiration were investigated. The resistance study showed similar patterns of resistance for both experimental and numerical results for various flow rates. The PIV results showed that inspiratory and expiratory flows had characteristic flow patterns that can be distinguished based on their recirculatory flow patterns.

**Keyword:** Computational fluid dynamics (CFD); Particle image velocimetry (PIV); Nasal cavity; Inspiration; Expiration