

Author's Accepted Manuscript

Unsteady Particle Tracking of Micro-particle Deposition in the Human Nasal Cavity under Cyclic Inspiratory Flow

Hojat Bahmanzadeh, Omid Abouali, Goodarz Ahmadi



PII: S0021-8502(16)30244-0
DOI: <http://dx.doi.org/10.1016/j.jaerosci.2016.07.010>
Reference: AS5025

To appear in: *Journal of Aerosol Science*

Received date: 29 June 2015
Revised date: 16 June 2016
Accepted date: 6 July 2016

Cite this article as: Hojat Bahmanzadeh, Omid Abouali and Goodarz Ahmadi Unsteady Particle Tracking of Micro-particle Deposition in the Human Nasal Cavity under Cyclic Inspiratory Flow, *Journal of Aerosol Science* <http://dx.doi.org/10.1016/j.jaerosci.2016.07.010>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Unsteady Particle Tracking of Micro-particle Deposition in the Human Nasal Cavity under Cyclic Inspiratory Flow

Hojat Bahmanzadeh^a, Omid Abouali^a, Goodarz Ahmadi^b

^a School of Mechanical Engineering, Shiraz University, Shiraz, Iran

^b Department of Mechanical and Aeronautical Engineering, Clarkson University, Potsdam, NY, USA.

Mailing address:	Dr. Abouali School of Mechanical Engineering Shiraz University Shiraz, Iran
E-mail:	abouali@shirazu.ac.ir
Tel:	+98-711-613 3034
Fax:	+98-711-647 3511

Abstract

In this study, a fully unsteady computational fluid dynamics (CFD) model was used and the transient airflow properties during the entire breathing cycle, including inhalation and exhalation in a human nasal cavity, were evaluated. Unsteady particle tracking was performed to find the particle motion and deposition in the nasal airway using a Lagrangian approach. In most of earlier computer simulations, the assumption of quasi-steady or steady airflows averaged over the inhalation cycle were typically used to reduce the computational cost. In the present work particular attention was given to assessing the accuracy of these assumptions and their consequence on particle deposition in a human nasal cavity with paranasal sinuses. The simulation results for the airflow field showed significant differences between the unsteady and quasi-steady cases at low breathing rates near the beginning and end of the inspiration cycle. For

Download English Version:

<https://daneshyari.com/en/article/6344290>

Download Persian Version:

<https://daneshyari.com/article/6344290>

[Daneshyari.com](https://daneshyari.com)