



## Computational Fluid Dynamics of Choanoagellate Filter-Feeding

**Asadzadeh, Seyed Saeed; Walther, Jens Honore; Nielsen, Lasse Tor; Kiørboe, Thomas; Dölger, Julia; Andersen, Anders Peter**

*Publication date:*  
2017

*Document Version*  
Peer reviewed version

[Link back to DTU Orbit](#)

*Citation (APA):*

Asadzadeh, S. S., Walther, J. H., Nielsen, L. T., Kiørboe, T., Dölger, J., & Andersen, A. P. (2017). *Computational Fluid Dynamics of Choanoagellate Filter-Feeding*. Abstract from 70th Annual Meeting of the American Physical Society Division of Fluid Dynamics (DFD17), Denver, United States.

---

### General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Abstract Submitted  
for the DFD17 Meeting of  
The American Physical Society

**Computational Fluid Dynamics of Choanoflagellate Filter-Feeding** SEYED SAEED ASADZADEH , Department of Mechanical Engineering, Technical University of Denmark, JENS WALTHER, Department of Mechanical Engineering, Technical University of Denmark and Swiss Federal Institute of Technology Zurich, Chair of Computational Science, LASSE TORE NIELSEN, THOMAS KIORBOE, National Institute of Aquatic Resources and Centre for Ocean Life, JULIA DOLGER, ANDERS ANDERSEN, Department of Physics and Centre for Ocean Life, Technical University of Denmark — Choanoflagellates are unicellular aquatic organisms with a single flagellum that drives a feeding current through a funnel-shaped collar filter on which bacteria-sized prey are caught. Using computational fluid dynamics (CFD) we model the beating flagellum and the complex filter flow of the choanoflagellate *Diaphanoeca grandis*. Our CFD simulations based on the current understanding of the morphology underestimate the experimentally observed clearance rate by more than an order of magnitude: The beating flagellum is simply unable to draw enough water through the fine filter. Our observations motivate us to suggest a radically different filtration mechanism that requires a flagellar vane (sheet), and addition of a wide vane in our CFD model allows us to correctly predict the observed clearance rate.

Seyed Saeed Asadzadeh  
Department of Mechanical Engineering, Technical University of Denmark

Date submitted: 17 Jul 2017

Electronic form version 1.4