PRASHANT DAS

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RESEARCH EXPERIENCE

Lab of Turbulent Flows, Mechanical Engineering
University of Alberta, Edmonton, AB. November 2018 - October 2020
Postdoctoral Fellow

- Conducted volumetric particle tracking velocimetry (3D-PTV) experiments to study flow turbulence in an asymmetric diffuser.
  - Developed an algorithm for anisotropic 3D binning of Lagrangian particle tracks.
- Project Management – Industrial project on heat transfer enhancement in pipe flows.
  - Calculated relevant parameters to effectively design an experimental rig.
  - Wrote technical reports, bill of materials for instrumentation, and made presentations for bi-weekly client meetings.
- Conducted wind tunnel experiments using a novel helium-filled soap bubble system to measure large-scale 3D flow field in the wake of an idealized ground vehicle.
- Conducted 3D-PTV experiments with several tracer particles in water to characterize their light scattering properties.
- Supervised undergraduate and graduate students towards conducting experiments and writing scientific manuscripts.

Biofluids Lab, Biomedical Engineering
Technion - Israel Institute of Technology, Haifa, Israel. October 2016 - October 2018
Postdoctoral Fellow

- Conducted CFD simulations on idealized human upper airway geometry to study aerosol deposition in lungs – part of a project funded by the European Research Council (ERC).
  - Simulated aerosol transport using discrete phase methods.
  - Showed a relation between particle size and patient age with an implication towards efficient drug delivery in children's lungs.
- Supervised graduate student on CFD simulations related to flow through bile ducts.

Flow Physics Lab, Mechanical Engineering
Indian Institute of Science, Bangalore, India 2013-2016
Senior Research Fellow

- Conducted experiments on fluid-structure interaction of unsteady jets with passive flaps using PIV, LIF, and high speed imaging.
- Showed experimentally that thrust can be enhanced using passive exit flexibility – relevant to bio-inspired underwater vehicles.
- Proposed a new time scale which collapses the kinematics of passive flaps during vortex formation.
- Supervised undergraduate summer interns on various research projects.

EDUCATION

Indian Institute of Science, India *2016*
PhD, Mechanical Engineering
Thesis Title: Unsteady two dimensional jet with flexible flaps at the exit.

Indian Institute of Science, India *2009*
MSc., Mechanical Engineering
Thesis Title: Effect of hinged rigid flaps on vortex pair generation.

PES Institute of Technology, India *2006*
B.Eng. (First Class with Distinction), Mechanical Engineering
Term Project: Retrofitting a four-stroke engine to run on compressed natural gas.

TEACHING

- Teaching Assistant for the graduate course "Fluid Mechanics", Indian Institute of Science, Bangalore. One academic semester.
  - Problem-solving tutorials and marking of assignments.
- Marking of assignments for the graduate course "Cardiovascular Flows & Blood Circulation" , Technion - Israel Institute of Technology, Haifa. Two academic semesters.
- Teaching Assistant for the undergraduate course "Non-Conventional Energy Sources", P.E.S Institute of Technology, Bangalore. One academic semester.
  - Marking of assignments.

TECHNICAL SKILLS

- Particle Image Velocimetry (Planar and 3D)
- Hot-wire anemometry
- Code development in MATLAB, Python
- Data visualization – Tecplot, ParaView
- Working knowledge of C/C++
- Image segmentation and analysis
- Particle tracking velocimetry (3D-PTV)
- Laser induced fluorescence
- CFD – ANSYS Fluent, ICEM
- Design of experiments
- CAD familiarity – SolidWorks, CATIA
- Measurement and control – LabVIEW

RESEARCH INTERESTS

- Experimental fluid dynamics
- Vortex dynamics
- Turbulent flows
- Fluid-Structure Interaction
- Unsteady flows
- Biofluid dynamics

AWARDS AND RECOGNITIONS

- 2006-2014, MHRD (Government of India) Scholarship.
- 2013, CSIR and CICS International Travel Grants (Government of India).

- 2005, Second prize in a paper presentation contest supported by Toyota-Kirloskar Motors at the undergraduate level.
- 2005, Third prize in a paper presentation contest organized by Institution of Engineers(India), Student's Chapter at the undergraduate level.

PUBLICATIONS

Journals

1. Volumetric measurement of turbulence and flow topology in an asymmetric diffuser.
   P Das, S Ghaemi
   Phys. Rev. Fluids, 2020.
2. Light-scattering of tracer particles for liquid flow measurements.
   P Das, S Ghaemi
   Meas. Sci. Tech., 2021
3. Unsteady two-dimensional jet in the presence of flexible flaps at the channel exit.
   P Das, R N Govardhan, J H Arakeri
   Journal of Fluid Mechanics, 2018.
4. Effect of hinged leaflets on vortex pair generation.
   P Das, R N Govardhan, J H Arakeri
   Journal of Fluid Mechanics, 2013.
5. Targeting inhaled aerosol delivery to upper airways in children: insight from computational fluid dynamics (CFD).
   P Das, E Nof , I Amirav , S C Kassinos , J Sznitman
   PLoS ONE, 2018.
6. *In silico* approaches to respiratory nasal flows: a review.
   K Inthavong, P Das, N Singh, J Sznitman
   Journal of Biomechanics, 2019.
7. In silico optimization of targeted aerosol delivery in upper airways via Inhaled Volume Tracking.
   M Algazi-Heller, E Nof, P Das, S Bhardwaj, S Kassinos, J Sznitman
   Clinical Biomechanics, 2020.
8. In situ-like aerosol inhalation exposure for cytotoxicity assessment using airway-on-chips platforms.
   S Elias-Kirma, A Artzy-Schnirman , P Das, M Heller-Algazi, N Korin and J Sznitman
   Front. Bioeng. Biotechnol., 2020.
9. In Silico Optimization of Fiber-Shaped Aerosols in Inhalation Therapy for Augmented Targeting and Deposition across the Respiratory Tract.
   L Shachar-Berman, S Bhardwaj, Y Ostrovski, P Das, P Koullapis, S Kassinos and J Sznitman
   Pharmaceutics, 2020.
10. Prey Capturing Dynamics and Nanomechanically Graded Cutting Apparatus of Dragonfly Nymph.
    L Kundanati, P Das, N M Pugno. **Materials**, 2021.

Conferences

1. Prashant Das, R. N. Govardhan, J. H. Arakeri.
   Formation of vortex pairs with hinged rigid flaps at the nozzle exit. *Bulletin of the American Physical Society*, 66^{th} Annual Meeting of the APS Division of Fluid Dynamics (2013), Volume 58, No. 18.
2. Prashant Das, Eliram Nof, Israel Amirav, and Josué Sznitman.
   Evolution of respiratory flow phenomena with age and implications for inhalation aerosol targeting. *World Congress of Biomechanics* (2018), Dublin, Ireland.
3. Prashant Das, Sina Ghaemi.
   Flow topology and turbulence in a three-dimensional asymmetric diffuser. *Rocky Mountains Thermofluids Meeting* (2020), Revelstoke, BC, Canada. (Conference canceled)
4. A Booysen, P Das, S Ghaemi. Shake-the-Box PTV in the Wake of an Ahmed Body using Helium Filled Soap Bubbles. *13th International Symposium on Particle Image Velocimetry* – ISPIV 2019 Munich, Germany.
5. A Booysen, P Das, S Ghaemi. Shake-the-box PTV in the wake of an Ahmed body using Helium filled soap bubbles. *2^{nd} Annual Okanagan Fluid Dynamics Meeting* (2019) - Canmore, Canada.
6. Kirma S, Artzy-Schnirman A, Das P, Dorfman S, Zidan H, Fishler R, Korin N, and Sznitman J. True-scale in vitro bronchial platforms for inflammatory epithelium screening induced by TRPV1. *Delivering Therapeutics Across Biological Barriers.* Dublin, Ireland, May 2019.
7. Mobin Alipour, Marco De Paoli, Prashant Das, Sina Ghaemi, Alfredo Soldati. Discrimination And Tracking Of Anisotropic Particles In Turbulent Channel Flow. *20^{th} International Symposium on Applications of Laser and Imaging Techniques to Fluid Mechanics.* Lisbon, Portugal, July 2020. (Conference canceled)

OTHER

- *Reviewer*: Journal of Fluid Mechanics, Journal of Biomechanics, Clinical Biomechanics, Computer methods in Biomechanics and Biomedical Engineering.
- *Member*: American Physical Society (2013-2014).
- Volunteer for IC-ICAME (2008), an international conference held at the Indian Institute of Science, Bangalore, India.
- Volunteer for annual 'Open Days' at the Indian Institute of Science (India) - to showcase research activities to the student community and the public.
- Set up experiments to demonstrate fluid flow measurement techniques for the graduate course on 'Experimental Engineering' at the Indian Institute of Science (India).
- Member of the organising committee for a technical festival organised at PES Institute of Technology (2006), Bangalore.

EMPLOYMENT AUTHORIZATION

Permanent Resident of Canada.