Bidesh Sengupta

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D.o.B: 23/02/1989
Nationality: Indian
Marital status: Married

Highlights

- *Development of In-house coding of 3D FVM with MPI compressible flow solver (Riemann solver).*
- *Development of Coupled FVM + VPM (Vortex Particle Method) + FMM (Fast Multipole Method) to solve flow with the rotors.*
- *Development of mesh deformation solver by Radial Basis Function (RBF).*
- *Aerodynamics of Helicopters, UAM etc.*
- *Riemann-based shallow water droplet equations.*
- *Icing simulations.*
- *OpenFOAM coding.*
- *Proper Orthogonal Deomposition (POD), Dynamic Mode Decomposition (DMD), Reduced Order Modeling (ROM), Artificial Neural Network (ANN).*

Education

Sept' 2018 – Aug' 2022	**Ph.D., Gyeongsang National University, S. Korea** Aerospace Engineering. Thesis title: *Computational Modeling of In-Flight Ice Accretion and Shedding on Rotorcraft using Hybrid Lagrangian-Eulerian Framework.* Supervisor: Prof. Rho Shin Myong, Prof. Hakjin Lee.
Sept' 2014 – June' 2016	**M.Sc., Lappeenranta University of Technology, Finland** Energy Technology. Thesis title: *Droplet Deposition in the Last Stage of Steam Turbine.* Supervisor: Prof. Teemu Turunen-Saaresti.
Aug' 2007 – May' 2011	**B. Tech., National Power Training Institute (E.R.), India** Power Engineering. Thesis title: *Integrated Drying and Partial Gasification for Low NOx Pulverized coal Fired Boiler.* Supervisor: Prof. Chittatosh Bhattacharya.

Employment History

Feb' 2023 – Present	**University of Bologna, Italy,** Research Fellow. Work profile: *Analyzing the flow field in Urban topology and terrain, Validation of the flow field in Urban topology, down scaling, Large Eddy Simulation (LES).*
May' 2023 – Jan' 2024	**Nanyang Technological University, Singapore,** Research Fellow. Work profile: *Energy efficient data center, Development of NS solver with Chorin's algorithm for fast CFD in OpenFOAM, Chip cooling research with conjugate heat transfer (CHT), Modification of CHT solver with Chorin's algorithm in place of SIMPLE.*

Oct' 2022 – Apr' 2023   ◗ **Gyeongsang National University, S. Korea,** Senior Researcher.
Work profile: *Rotorcraft aerodynamics, icing, Artificial Intelligence in fluid dynamics, Compressible DNS, Quantum computing in fluid dynamics.*

Feb' 2018 – Aug' 2018   ◗ **Emerson Automation Solutions, India,** Senior Engineer.
Work profile: *Modelling high fidelity simulation of Combined Cycle, Coal Fired Power Plant, parameterization, testing, tuning to match the behavior and prediction of the actual power plant.*

Aug' 2016 – Feb' 2018   ◗ **West Bengal University of Technology, India,** Lecturer (Department of Mechanical Engineering.)
Work profile: *Teaching of Heat and Mass Transfer, Design of Machine Elements, Engineering Mechanics in the odd semester and Fluid Mechanics, Fluid Machinery, Machine Design in the even semester. Laboratory (Under Graduate) In-charge of Applied Fluid Mechanics and Heat Transfer.*

Jun' 2015 – Aug' 2016   ◗ **Lappeenranta University of Technology, Finland,** Junior Research Assistant (Laboratory of Fluid Dynamics.)
Work profile: *Meshing and CFD simulation of Centrifugal Compressor. Geometry, meshing, and CFD analysis of flow through Gas Turbine Stator.*

Jul' 2011 – Jul' 2014   ◗ **Alstom India Ltd, India,** Engineer (Division of Steam Generators and Auxiliaries.)
Work profile: *Performance Analysis of new as well as old Air-preheater (RAPH), heat transfer calculations and thermodynamic Analysis. Failure Analysis. Analysis and engineering calculation on load-bearing parts of RAPH, Drawing checking, and report writing. Responsible for knowledge Transfer on Thermo-fluid Analysis of RAPH from Alstom Technical Services (Shanghai) Co. Ltd.*

Code Development

- ◗ *Development of In-house compressible Magneto-hydrodynamic solver to study shock-bubble interaction in presence of magnetic field. (OpenFoam)*

- ◗ *Development of In-house Navier-Stokes solver with boussinesq approximation to solve the problem with natural and mixed convection. (OpenFoam)*

- ◗ *Development of In-house 3D FVM (unstructured grid) with MPI compressible flow solver (Riemann solver) coupled FVM + VPM (Vortex Particle Method) + FMM (Fast Multipole Method) to solve flow with the rotors (from scratch).*

- ◗ *Development of In-house 3D FVM (unstructured grid) with MPI shallow water droplet equation from existing 2D code.*

- ◗ *Development of In-house 3D FVM (unstructured grid) shallow water ice accretion equation from existing 2D code.*

- ◗ *Development of compressible Navier Stokes Fourier (NSF) solver with bulk viscosity along with Myong's vorticity transport equation to study the effect of bulk viscosity. (OpenFoam)*

- ◗ *Development of 6-DOF solver to predict ice trajectory mechanism after shedding from accretion surfaces.*

- ◗ *Development of ANN code using exiting open-source libraries.*

Skills

Languages   ◗ Bengali (Mother tongue), English, Hindi.

Programming   ◗ C++, FORTRAN, Python.

Skills (continued)

Misc.   🔖   Artificial Neural Network (ANN), Massage Passing Interface (MPI), OpenFOAM coding, snappyHexMesh, CF-MESH+, ParaView, LaTeX

Research Publications

Journal Articles

1   Asokakumar Sreekala, V., & **Sengupta, Bidesh**. (2024). Characterizing nonlinear flow dynamics in hydrodynamic and magnetohydrodynamic regimes through modal decomposition. *Available at SSRN 4724842*.

2   **Sengupta, Bidesh**, Lee, Y., Araghizadeh, M., Myong, R., & Lee, H. (2024). Comparative analysis of direct method and fast multipole method for multirotor wake dynamics. *International Journal of Aeronautical and Space Sciences*, 1–20.

3   Singh, S., **Sengupta, Bidesh**, & Rana, S. (2024). Analysis of thermal mixing and entropy generation during natural convection flows in arbitrary eccentric annulus. *Axioms*, *13*(4).

4   Prine Raj, L., Esmaeilifar, E., **Sengupta, Bidesh**, Jeong, J., & Myong, R. (2023). Coarray fortran parallel implementation of a finite volume-based ice accretion simulation code. *International Journal of Aeronautical and Space Sciences*.

5   Lee, H., **Sengupta, Bidesh**, Araghizadeh, M., & Myong, R. (2022). Review of vortex methods for rotor aerodynamics and wake dynamics. *Advances in Aerodynamics*, *4*(1), 1–36.

6   **Sengupta, Bidesh**, Raj, L. P., Cho, M., Son, C., Yoon, T., Yee, K., & Myong, R. (2021). Computational simulation of ice accretion and shedding trajectory of a rotorcraft in forward flight with strong rotor wakes. *Aerospace Science and Technology*, *119*, 107140.

7   Cho, M., **Sengupta, Bidesh**, Raj, P. L., & Myong, R. (2020). Trajectory prediction of ice shedding from an aircraft using cfd and rigid body dynamics. *Journal of Computational Fluids Engineering*, *25*, 13–24.

8   **Sengupta, Bidesh**, & Bhattacharya, C. (2018). Investigation of energy loss on fractional deposition in last stages of condensing steam turbine due to blade shape and moisture droplet size. *Journal of Engineering for Gas Turbines and Power*, *140*(7).

9   **Sengupta, Bidesh**, & Bhattacharya, C. (2017). Influence of blade shape and water droplet size on fractional deposition in the last stages of steam turbine. *Int. J. Emerging Technol. Adv. Eng.*, *7*(4).

10   Bhattacharya, C., & **Sengupta, Bidesh**. (2016). Effect of ambient air temperature on the performance of regenerative air preheater of pulverised coal fired boilers. *International Journal of Energy Technology and Policy*, *12*(2), 136–153.

Conference Proceedings

1   Asokakumar Sreekala, V., Chourushi, T., **Sengupta, Bidesh**, & Myong, R. S. (2022). Effects of bulk viscosity, vibrational energy, and rarefaction on flow and vorticity fields around simple bodies at hypersonic speeds. In *AIAA SCITECH 2022 Forum* (p. 1065).

Book Chapters

1   Rana, S., **Sengupta, Bidesh**, & Singh, S. (2024). Natural convection study in cylindrical annulus through openfoam. In *Computational fluid flow and heat transfer* (pp. 33–45). CRC Press.

2   Singh, S., & **Sengupta, Bidesh**. (2024). Shock wave effects on hydrodynamic instability in elliptical bubbles. In *Computational fluid flow and heat transfer* (pp. 263–276). CRC Press.

Conference Presentations

- *Direct numerical simulation of shock turbulence interaction with bulk viscosity effects, The 34th International Symposium on Shock Waves, July 2023, South Korea. (Presented by Dr. Jyoti Prakash Panda)*
- *Investigation of the Effect of Pseudo-Random Number Generating Algorithms on DSMC Simulation, International Symposium on Rarefied Gas Dynamics, July 2022, South Korea.*
- *Prediction of pressure field on rotorcraft fuselage using NVLM/CFD coupling method, Korea Computational Fluid Engineering Fall Conference, November 2021, South Korea.*
- *Computational Simulation of Wake Interaction of Two Rotors in Hovering and Forward Flight Conditions, Korean Aerospace Society Conference, July 2021, South Korea.*
- *Numerical Simulation of Ice Accretion and Ice Shedding Trajectory on KC-100 Aircraft, The 7th Asian Symposium on Computational Heat Transfer and Fluid Flow, September 2019, Japan.*

References

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