NITHIN PANICKER

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SUMMARY

Ph.D. from Centre for Multiphase Flow Research `https://mfr.iastate.edu/`, Iowa State University with **7 years** of research **experience in CFD modeling and simulation of turbulent two-phase flows**.

AREAS OF INTEREST

Turbulence, bubbly flows, sprays, Numerical model development for multi-phase flows, CFD study of multiphase flows in Industrial scale systems, Numerical code development using C++ or OpenFOAM

EDUCATION

Iowa State University, Ames *Dec. 2017*
Ph.D. in Mechanical Engineering

University of Cincinnati, Ohio *Jan. 2012*
M.S. in Mechanical Engineering

National Institute Of Technology, Surathkal *August. 2009*
B.Tech. in Chemical Engineering

WORK EXPERIENCE

Oakridge National Lab April 2020 - present
CFD Application Engineer/Postdoctorate Research Associate *Oakridge, TN*

- Develop Computational Fluid Dynamics based digital twin for Aluminium smelting process and Heat Recovery Steam Generator for Industrial clients
- Sustain collaboration with industrial partners
- Develop new capabilities in the open source code OpenFOAM for nuclear applications
- Provide simulation support for an in house Coarse Mesh Higher Order solver for Nuclear applications

FORD Motors July 2018 - April 2019
Research Engineer *Dearborn, MI*

- Develop CFD models for water management applications
- Perform multiphase simulations for water ingress into the engine bay, water ingress into the luggage compartment during lift gate opening/closing
- Develop analytical models for droplet dynamics on the lens/lidar of autonomous vehicle to couple it with CFD
- Python scripting to automate processes in the Particle based software PreonLAB
- Perform field test on automobiles to secure data for CFD validation
- Mentor young Engineers to reach their professional goals

Elite logistics Inc Sep 2017 - July 2018
CFD Engineer *Grass Lake, MI*

- Developed an automated **3D CFD tool based on OpenFOAM** usable by any Engineers to perform design trend studies for exhaust components primarily catalytic converters
- Proposed design suggestions by performing CFD simulations of both system level and component level exhaust aftertreatment systems (Diesel Oxidation Catalyst, Selective Catalytic Reduction, Muffler, y-pipe) for various automotive clients (John Deere, GM and Isuzu).
- Performed conjugate heat transfer analysis for various designs of exhaust systems to understand and control the skin temperature
- Performed **evaporative spray simulations** to predict Ammonia uniformity in SCR systems
- Performed flow noise predictions for Mufflers to aid acoustic Engineers
- Performed Design iterations on different components in Star-CCM+ design manager to optimize the performance of the component
- Interact with cross-functional teams (Design Engineers, Program Engineers) to understand the design requirements of various automotive clients.

Robert Bosch LLC May 2015 - August 2015
Research intern Engineer *Palo Alto, CA*

- Aided in the modeling and simulation of Gas Absorption Heat pump (GAHP) which is a key component of HVAC unit.
- Performed literature study on GAHP and developed a computational framework for the absorption process inside the pump.
- Developed mass and heat transfer algorithms for the processes and performed numerical simulations using FLUENT.
- Implement the algorithm using UDF (C code) in FLUENT.

RESEARCH EXPERIENCE

Iowa State University December 2013 - Sep. 2017
Research assistant *Ames, IA*

- Added CFD sub models to **twoPhaseEulerFoam solver in OpenFOAM-2.3.x** to facilitate turbulence gas-liquid flow study in a bubble column.
- Modified the algorithm of twoPhaseEulerFoam to incorporate a body force term which balanced the weight of the liquid to prevent statistical instationarity of the system
- Performed parallel mesoscale CFD simulation of **gas-liquid** flows encountered in bubble columns.
- Quantified the unclosed source terms appearing in a two-phase RANS model from the simulation data.
- Analyzed the two-phase flow phase interactions and developed a macroscale turbulence Reynolds Stress Transport model
- Modified the existing **turbulence class in OpenFOAM** to implement the developed Reynolds Stress Model for two-phase flows.
- Studied the applicability of the Reynolds Stress Transport Model in a bubble column using **OpenFOAM**
- Performed stability analysis on two-fluid model and corrected the hyperbolicity
- Performed CFD simulation of two-phase flow using OpenFOAM with the hyperbolic model on multiple grid resolution to demonstrate the grid convergence

Iowa State University January 2012 - December 2013
Research assistant *Ames, IA*

- Performed CFD analysis of **pool boiling process** on biphillic surfaces by changing the surface wettability using the CFD software package TRANSAT.
- The phase transformation was captured using **Level set methods** and a sub-grid model was added to capture the contact line evaporation.
- Analyzed the data and obtained the optimum wetting angle which gave maximum heat removal through boiling.
- Developed an analytical model for heat removal rate and compared it with the simulation output.

PUBLICATIONS

Panicker, N., Passalacqua, A.,Fox, R. O. (2018). On the hyperbolicity of the two-fluid model for gas–liquid bubbly flows.*Applied Mathematical Modelling*, 57, 432-447

Panicker, Nithin, Alberto Passalacqua, and Rodney O. Fox. "Computational study of buoyancy driven turbulence in statistically homogeneous bubbly flows." *Chemical Engineering Science* 216 (2020).

Panicker, N., Passalacqua, A., Fox, R.O. (2020) Computational study of the effect of homogeneous and heterogeneous bubbly flows on bulk gas-liquid heat transfer, *Journal of Fluids Engineering*, FE-1181

Panicker, N., Passalacqua, Fox, R.O.(2017) Turbulent bubbly flows: A Review, *Int. J. of Multiphase Flow* (in preparation)

Panicker, Nithin S. Computational models for turbulent bubbly flows in bubble columns. Diss. Iowa State University, 2017.

Panicker, Nithin S. Numerical Modeling of Flow and Deformations Induced in a Droplet Subjected to Alternating Electric Field. Thesis. University of Cincinnati, 2012.

Panicker, Nithin S. Mathematical modeling of liquid-liquid extraction. thesis National Institute of Technology, Surathkal, 2009.

CONFERENCE PRESENTATIONS

Panicker, N., Passalacqua, A.(2016) Computational study of turbulent bubbly flows , 2016 Annual meeting of AIChE, San Francisco, CA.

Panicker, N., Passalacqua, A.(2014) Analysis and Closure Verification of Multiphase Turbulence Models for Gas -Liquid Flows, 2014 Annual meeting of AIChE, Atlanta, GA.

Panicker, N., Attinger, D.(2012) Numerical study of **nucleate pool boiling process**: Effect of surface wettability, 2014 Annual meeting of ASME, Houston, TX.

Panicker, N (2007) Economical **Chemical Engineering techniques** to perform **solar water desalination**, 2007 Annual technical symposium Manipal University, Manipal, India.

Panicker, N (2007) Modeling and simulation of **quenching process of steel**, 2007 Annual technical symposium Indian Institute of Technology, Chennai, India.

REVIEWER

Journal of Fluids Engineering
Journal of Heat transfer
Journal of Enhanced heat transfer
American Institute Chemical Engineers
Canadian Journal of Chemical Engineering

HONORS AND AWARDS

University Graduate Scholarship granted by University of Cincinnati to perform Masters.
Best innovation award in boat modeling contest for powering the boat with **ethanol** at the undergraduate **annual technical symposium** Engineer 2008.

TEACHING SKILLS

Iowa State University September 2009 - December 2011
Teaching associate *Ames, IA*

- Coordinated lab functions and key teaching activities for the Heat Transfer course with more than 100 students.
- Mentored and coordinated two fellow students for teaching assistant position.
- Developed and incorporated new design components.
- Streamlined the teaching process by building systemic and documented guideline.

SOFTWARE SKILLS

Computer Languages	proficient in C, ++
CFD packages	FLUENT, OpenFOAM, TRANSAT
Post processing tools	paraview, MATLAB, Tecplot