PRAPANCH NAIR

PERSONAL INFORMATION

DOB	06 October, 1985
nationality	Indian
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RESEARCH EXPERIENCE

Feb'16–till date **Post Doctoral Fellow**

Institute for Multiscale Simulation, Friedrich-Alexander Universität Erlangen-Nürnberg

• *Multiphysics in additive manufacturing*
Development of multiphysics meshless solver for coupled laser radiation, heat transfer, fluid flow and phase change problems, based on smoothed particle hydrodynamics (sph).
• *Coordinator, ugc-daad project: deep conversion in packed bed reactors*
Investigation of effect of catalyst pellets packing on the performance of trickle-bed reactors. The study applies various numerical techniques: ballistic deposition of particles, sph and fvm, and experimental methods: resin filling and x-ray tomography of packings.
• *Micromechanics of unsaturated wet granular media*
Development of interface models in mesh free methods; applying them to solve dynamics of wet unsaturated media.
• *Wetting phenomena*
Development of novel wetting models in meshfree methods; applying them to solve interaction of liquids with surfaces of different wetting properties.
• *HPC development*
Performance improvements of snusph—in-house isph code—for accessing the computing power of heterogenous clusters. Focus on SIMD (vecorization) aware code and libraries.

Jul'15-Jan'16 **Research Associate**

Indian Institute of Science, Bangalore

Dept. of Mechanical Engineering
Developed a FVM solver for two phase flows for application to multiscale problems

Aug'10–Jul'15 **Ph.D.**

Indian Institute of Science, Bangalore

GPA: 6.3/8.0 · *Dept. of Mechanical Engineering*
Developed SNUSPH: An Incompressible Smoothed Particle Hydrodynamics (ISPH) Code with free surface modeling, multiphase, rigid body interactions, elastic membrane interactions and surface tension. Implementation of version control and OpenMP parallelization of SNUSPH. Applied the code for solving problems in water-entry of rigid bodies, fluid structure interaction and multiphase flows involving compressible and incompressible phases.

Introduced an accurate and efficient free surface model for ISPH method. Improved a surface tension model based on Moving Least Squares algorithm to reconstruct interfaces and further extended to model elastic membranes. Identified a volume conservation issue that particle methods suffer from, and introduced an improved pressure model.

Feb–April '10 **Scientist-C**

Indian Space Research Organization

Developed a Earth coordinate transform tool to switch between various coordinate systems used in space mechanics.

Mar'09–Feb'10 **Scientist/Engineer**

RWDI India Pvt. Ltd.

Used OpenFOAM to study natural convection in micro-climates. Studied wind loads on chimneys and buildings. Proposed wind-dower design modifications based on CFD studies. Developed snow flake transport model in OpenFOAM.

2003–2007 Bachelor of Engg., Aeronautical Engineering

Anna University, Tamilnadu, India.

Score 83% · Park College of Engg. & Technology
Proposed an artificial entropy correction for FVM solutions of hyperbolic Partial Differential Equations for the final year project.

JOURNAL PUBLICATIONS

Michael Blank, Prapanch Nair, Thorsten Pöschel, "Capillary viscous flow and melting dynamics: Coupled simulations for additive manufacturing applications," *International Journal of Heat and Mass Transfer*, 2018. *(Accepted, in print)*.

Prapanch Nair, Gaurav Tomar, "Simulations of gas-liquid compressible-incompressible systems using SPH," *Computers & Fluids*, 2018.

Nikhil Agrawal, Prapanch Nair, Thorsten Pöschel, Shantanu Roy, "Isotropy of sphere packings in a cylindrical connement," *Chemical Engineering Journal, 2018.*

Prapanch Nair, Thorsten Pöschel, "Dynamic Capillary phenomena using ISPH," *Chemical Engineering Science* 176 (2018) 192–204

Prapanch Nair, Gaurav Tomar, "A study of energy transfer during water entry of solids using incompressible SPH simulations, *Sdhan* 42.4 (2017) 517531.

Prapanch Nair, Gaurav Tomar, "Volume Conservation issues in Incompressible Smoothed Particle Hydrodynamics (ISPH)," *Journal of Computational Physics* 297 (2015) 689 – 699.

Prapanch Nair, Gaurav Tomar, "An improved free surface modeling for incompressible SPH," *Computers and Fluids* 102 (2014) 304 – 314.

CONFERENCE PRESENTATIONS AND PROCEEDINGS

Powders & Grains

July, 2017 · Montpellier, France.
Structural changes in wet granular matter due to drainage
Authors: Prapanch Nair, Thorsten Pöschel

12th International SPHERIC workshop

June, 2017 · Ourense, Spain.
Rounding of a melting particle
Authors: Prapanch Nair, Michael Blank, Thorsten Pöschel

42nd National Conference on Fluid Mechanics and Fluid Power

December 2015 · NITK Suratkal, India.
A study of water entry of rigid bodies using Incompressible Smoothed Particle Hydrodynamics
Authors: Prapanch Nair, Gaurav Tomar

14th Asian Congress of Fluid Mechanics

October 2013 · Hanoi, Vietnam
A Deformation Gradient based formulation for Incompressible Smoothed Particle Hydrodynamics
Authors: Prapanch Nair, Adithya Vijayakumar, Gaurav Tomar

5th National Conference on Wind Engineering

November 2009 · Surat, India
Application of CFD in Stack Interference
Authors: Prapanch Nair, Suresh Kumar, Jon Galsworthy

MENTORING

Students

2018 · PhD Student
Instabilities in melt pool due to laser heating of metals and polymers
2018 · Two masters students working on packings of complex shaped particles in chemical reactors

2017 · Master's Theses
Heat transfer and phase change in additive manufacturing applications
2017 · Exchange student (Master's)
Characterizing packing of reactor beds—experiments and computations

Lecturing

2017 · IIT Delhi
Four day introductory lecture on meshless methods
2013,14 · Coimbatore, India
Crash course for GATE entrance exam candidates

COMPUTATIONAL SKILLS

Languages

C++ Advanced C Python Fortran

Software/Libraries

Linux	OpenMP	Gerris	GIT
MPI	Torque-PBS	OpenFOAM	SLURM
VTK	CUDA	OpenCL	PovRAY
Json	xml	vtk	Matplotlib
Doxygen	html/css	gdb	valgrind

BELLS & WHISTLES

Positions held

2013 – Elected Sec. Academic Affairs,
Students' Council, Indian Institute of Science

2012 – Communications committee member, Students' Council

2012 – Convener, Fine Arts Club, Indian Institute of Science

Languages

English · Hindi · Malayalam · Tamil

Presentation skills

LaTeX · SVG · HTML/CSS · Gimp · Poster/infographic designs

Interests

Pencil sketching · Running · Reading · Typography

REFERENCES

FAU, Erlangen.

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Indian Institute of Science, Bangalore.

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