

## **Kedar Prashant Shete**

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### **SUMMARY**

I am a researcher at the University of Massachusetts Amherst where I study Latent Thermal Energy Storage Systems numerically and experimentally. I conduct experiments in natural convection and phase change using Peltier modules as heat pumps and National Instruments(NI) modules with LabVIEW for the control system. I implement Finite Volume Methods(FVM) and Spectral Element Methods (SEM) for my numerical research, using the open-source code NEK5000 and ANSYS Fluent for Computational Fluid Dynamics(CFD). I have experience with designing air cooled condensers and bearing systems. I have conducted over 30 energy efficiency and retro-commissioning visits with the Industrial Assessment Center (IAC), where I routinely calculate thermal loads, suggest improvements to operation of HVAC systems, optimize the operation of chillers, recommend solar + battery storage, etc. Additionally, I am proficient in C, C++, FORTRAN, Python, MATLAB. User of LaTeX and SVN for writing and version control.

### **EDUCATION**

PhD in Mechanical Engineering University of Massachusetts Amherst	Cumulative GPA: 3.822 May 2021 (expected)
MS in Mechanical Engineering University of Massachusetts Amherst	Cumulative GPA: 3.771 September 2019
Bachelor of Engineering in Mechanical Engineering Birla Institute of Technology and Science-Pilani, India	August 2014

### **PUBLICATIONS**

- A Physics-based scaling for Latent Thermal Energy Storage Devices, Shete, Kedar Prashant, de Bruyn Kops, Steve, Dragoljub (Beka) Kosanovic, submitted to Applied Energy
- Area of Scalar Isosurfaces in Isotropic Homogeneous Turbulence as a Function of Reynolds and Schmidt Numbers, Shete, Kedar Prashant; de Bruyn Kops, Steve, Journal of Fluid Mechanics, 2019
- Area of Scalar Isosurfaces in Homogeneous Isotropic Turbulence, KP Shete, S De Bruyn Kops - Bulletin of the American Physical Society, 2019
- K.P. Shete, M. Kalola, Mahesh Dasar, R.S. Patil Effect of Novel Swirling Perforated Distributor on Fluid Dynamic Characteristics of Circulating Fluidized Bed Riser, ASME Power and Energy Conference 2016, June 2016
- K.P. Shete, P. A. Kulkarni, and R.S. Patil, Computational Studies on Effects of Novel Geometries of Distributor Plates on Fluid Dynamics Characteristics of Circulating Fluidized Bed Riser in 5th International Conference on Fluid Mechanics and Fluid Power (FMFP 2014) (pg-199), 2014.
- P. A. Kulkarni, K.P. Shete, S. Jogdankar, and R.S. Patil, Effect of Barrel Wall Fin of the Cyclone Separator on Fluid Dynamic Characteristics in 5th International Conference on Fluid Mechanics and Fluid Power (FMFP 2014) (pg-103), 2014.

## SKILLS

- **Computational Fluid Dynamics (CFD):** ANSYS Fluent, NEK5000, ICEM CFD, in-house pseudo-spectral DNS code
- **Modeling:** PTC Creo, AutoCAD, ANSYS Workbench and Design Modeler (and the willingness to learn many more !)
- **Languages:** C, C++, MATLAB, Python, Shell Script, LaTeX, FORTRAN
- **Experimental Methods:** Design of Experiments, LabVIEW, Error Analysis, SPICE V3
- **Field Skills:** Fluke Energy Analyser, Boiler Testing, Infrared Imaging and Analysis, HOBO Ware Data Loggers, Industrial Safety
- **Coursework:** Turbulence, Laboratory Techniques in Physics, Advanced Fluid Mechanics, Advanced Numerical Methods, Solidification and Phase Change Heat Transfer, Advanced Thermodynamics, Solar Thermal and Direct Energy Conversion

## RESEARCH EXPERIENCE

### Graduate Research Assistant

Sep 2019 - present

Center for Energy Efficiency and Renewable Energy(CEERE)  
University of Massachusetts Amherst

Project: Parametric study of Latent Heat Thermal Energy Storage(LHTES) with emphasis on physics based form for performance correlation

- Reviewed 50 years worth of literature to identify the intersection between LHTES and classical convection research
- Validated our FVM simulation technique using experimental data
- Fully automated the simulations and post-processing using a MATLAB script
- Derived a physics based scaling of the charging rate of a LHTES device as a function of Grashof and Prandtl numbers
- Exploring SEM with NEK5000 for convection + phase change simulations
- Developing an experimental setup to conduct a Particle Image Velocimetry(PIV) study of turbulent natural convection

### Graduate Research Assistant

Oct 2016 - Dec 2018

Turbulence Simulation Laboratory  
University of Massachusetts Amherst

Project: Isosurface Area in Homogeneous Isotropic Turbulence(HIT) as a function of Reynolds and Schmidt Numbers

- Proposed and proved an isosurface area calculation method based on Federer's Coarea equation.
- Formulated an algorithm to implement method using spectral interpolation(exact) and Monte Carlo integration in DNS datasets
- Created fully parallel code in C++ with OpenMPI and integrated with in-house pseudo-spectral DNS code
- Calculated the isosurface statistics for 28 different DNS datasets ranging from Taylor Reynolds Number 24 to 633 and Schmidt number 0.1 to 7, obtained a power law scaling with Péclet number, published results

### Undergraduate Researcher

Jan 2014 - Aug 2014

Birla Institute of Technology and Science-Pilani, India

Projects: Effects of novel distributor plate geometries on multiphase flow in Circulating Fluidized Bed (CFB) risers and heat recovery using fins from Cyclone Separators

- Validated numerical results with published experimental data for transient and steady states

- Studied the effect of distributor plate design on pressure drop and flow patterns in a CFB riser, published results
- Studied the effect of fin pitch and geometry on the collection efficiency of cyclone separator, published results

## WORK EXPERIENCE

### **Lead Energy Engineer**

Oct 2016 - present

Industrial Assessment Center(IAC)

University of Massachusetts Amherst

Responsibility: Assessing industrial facilities and identifying measures of saving or producing additional energy, estimating expenses for implementation, writing reports in collaboration with IAC team and facility engineering teams. Listed below some typical recommendations.

Combined Heat and Power, Variable Speed Drives (VSD/VFD) on pumps/motors, HVAC control algorithms for temperature and humidity to optimize comfort and energy use, Solar PV, Water turbines, Air Compressors, Lighting, Heat Pumps, Chillers

### **Teaching Assistant**

Jan 2017 - May 2017

University of Massachusetts Amherst

Aerodynamics MIE-440

Responsibility: Taught two guest lectures, Created potential flow method codes in MATLAB to solve flow around bluff bodies and airfoils for Aerodynamics, graded assignments and exams.

### **Teaching Assistant**

Sep 2017 - Dec 2017

University of Massachusetts Amherst

Advanced Fluid Mechanics M&I-607

Responsibility: Prepared solutions, graded assignments and exams

### **Teaching Assistant**

Sep 2018 - Dec 2018

University of Massachusetts Amherst

Introduction to Numerical Methods M&I-597 NM

Responsibility: Prepared solutions, graded assignments and exams

### **Senior Engineer**

Mar 2016 - Jul 2016

Thermax Ltd.

Responsibility: Design an air cooled condenser using Heat Transfer Research, Inc. (HTRI) and heat transfer correlations

- Need to diversify the air cooled condensers beyond the range of in-house software
- Developed an alternative design procedure using correlations and HTRI
- Validated method using site data for 50 different site installations

### **Application Engineer**

Jun 2014 - Sep 2015

SKF India Ltd.

Responsibility: Design bearing systems for Original Equipment Manufacturers(OEM's)

- Designed bearing systems for crushers, vibrating screens, conveyors, motor and pump systems, transmission boxes, gearboxes
- Retrofit improved bearing systems in textile, pulp and paper and metals industry
- Root Cause Failure Analysis (RCFA)
- Secured achievement award for successful improvement in energy efficiency of Ring Frame Spinning Machines at Arvind Mills, 2014

<b>INTERNSHIPS</b>	<b>Engineering Design Intern</b> Bharat Forge Ltd.	Jul 2013 - Dec 2013
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- Designed a fixture for hot fitting of gears onto crankshafts
- Proposed a solution for deburring in crankshaft oil holes which would avoid damage to the surface finish

<b>Intern</b> CASPRO Metal Industries	May 2012 - Jul 2012
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- Proposed a system to manage over 350 heavy patterns and store them. Providing a design for storage rack and selected retrieval cart, obtaining quotes from vendors.