

Ritwik Bhattacharya

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EDUCATION

Purdue University, West Lafayette

Ph.D. in Mechanical Engineering

Aug 2024 – Aug 2029

Texas A&M University, College Station

Master of Science (Thesis) in Mechanical Engineering

Aug 2022 – Aug 2024

GPA: 3.88/4.0

Indian Institute of Engineering Science and Technology, Shibpur

Bachelor of Technology (Honors) in Mechanical Engineering

Jul 2018 – May 2022

GPA: 9.21/10.0

EXPERIENCE

Lennox International Inc., Dallas

Intern, Advanced Technology Group

Jun 2024 – Aug 2024

Supervisor: Mr. Kunal Bansal

- Reviewed the AHRI 1340 - 2023 performance rating standard for commercial units that establishes IVEC as the cooling metric for systems having capacities greater than 5.5 tons.
- Developed a numerical methodology for optimizing IVEC for a 6-ton heat pump (cooling mode) having a variable speed compressor.

Texas A&M University, College Station

Graduate Researcher, J. Mike Walker '66 Department of Mechanical Engineering

Oct 2022 – Aug 2024

Supervisor: Dr. Debjyoti Banerjee

- Investigated the electrochemical response of brass specimens having surface defects on exposure to aqueous silica nanofluids and POAT test coolant with the help of cyclic voltammetry and obtained the corrosion rates by extrapolating the Tafel curves.
- Conducted surface profiling of the alloy substrates bearing surface defects before and after exposure to the corrosives.
- Synthesized paraffin-oil-based nanofluid samples containing casein nanoparticles and experimentally obtained a surplus enhancement of 6.0% in nanofluid density with respect to the simple mixing rule prediction.
- Analyzed the TEM images of the oil-based nanofluid samples using ImageJ and determined the particle size distribution and the grayscale intensity variation in the nanocrystalline structures.

Indian Institute of Engineering Science and Technology, Shibpur

Undergraduate Researcher, Department of Mechanical Engineering

Aug 2021 – May 2022

Supervisor: Dr. Sujoy Kumar Saha

- Analyzed the enhanced heat transfer performances of Graphene Oxide/water nanofluid and GNP - Ag/water hybrid nanofluid in a hexagonal microchannel heat sink for fixed thermal boundary conditions in the laminar flow range with the help of the commercial CFD software Ansys Fluent.
- When Graphene Oxide/water was passed through the microchannel at 2 m/s, the thermal resistance decreased by 3.06% and 4.93% on adding 3% and 5% nanoparticle concentrations, respectively, in the base coolant.
- At $Re = 1000$, there was a 58.13% upsurge in the pumping power requirement and a reduction of 11.86% in the value of effective thermal resistance for fluid having 0.1% concentration of GNP-Ag compared to the base fluid.

Indian Institute of Technology, Bombay

Intern (Remote), Department of Mechanical Engineering

Apr 2021 – Oct 2021

Supervisor: Dr. Sandip Kumar Saha

- Developed a transient code in MATLAB for numerical modelling of a buoyancy assist adaptive charging-discharging thermal energy storage system using explicit Finite Difference method. The model assumes lumped capacitance along the radial direction of the tank and considers sinusoidally varying fluid inlet temperature.
- Using air as the working fluid in the annular pipe and water as the stored tank fluid, simulated the system's performance for a total time period of 60 hours and obtained 5% deviation in the middle section temperature and 8% deviation in top section temperature of the tank with respect to the published results.

CSIR - Central Mechanical Engineering Research Institute

Intern (Remote), Department of Mechanical Engineering

Jun 2021 – Jul 2021

Supervisor: Dr. Pranab Samanta

- Conducted a numerical investigation on the laminar flow of Graphene - water nanofluid through a Silicon microchannel heatsink, of rectangular cross - section, using commercial CFD software ANSYS Fluent.
- For 3 different fluid inlet speeds and external heat flux on the heat sink base wall, compared the maximum wall temperatures, thermal resistances and pumping power requirements of the device for different concentrations of the nanoparticles in water- to quantify the enhancement in heat transfer while using nanofluid.

Larsen & Toubro Construction and Mining Machinery, Durgapur

Intern, Hydraulics Department

Dec 2019 – Dec 2019

Supervisor: Mr. Arindam Dutta

- Studied the designs and functioning of different fluid power transmission components used in various construction vehicles.
- Carried out performance tests in the hydraulics lab to check the fluid delivery performance, heat generation in the components and associated fluid leakage, and categorized whether the tested component was operable or needed repairs.

TEACHING EXPERIENCE

Texas A&M University, College Station

Graduate Assistant Teaching, J. Mike Walker '66 Department of Mechanical Engineering

TX, United States

Jan 2023 – May 2024

- Responsible for instructing and managing lab sessions for 48 students in the Heat Transfer Lab (MEEN 464).

PUBLICATIONS

IOP Conference Series: Materials Science and Engineering

doi:10.1088/1757-899X/1206/1/012008

Simulation - based Study of Graphene-water Nanofluid flow through Microchannel Heatsink

Authors: Ritwik Bhattacharya, Pranab Samanta

American Society of Mechanical Engineers (ASME) Digital Collection

doi:10.1115/IMECE2023-117221

Investigation of Nanofin Effect (nFE) for Investigating the Anomalous Properties of Nanofluids

Authors: Ritwik Bhattacharya, Nandan Shettigar, Ashok Thyagarajan, Shahin Shafiee, Debjyoti Banerjee

ASME Open Journal of Engineering

doi:10.1115/1.4065511

Experimental Validation of Analytical Predictions for the “Deviant” Density of Oleo - Nanofluids Based on the nanoFin Effect

Authors: Ritwik Bhattacharya, Jonghyun Lee, Anindito Sen, Debjyoti Banerjee

CONFERENCES AND PRESENTATIONS

ASME IMECE 2023 - *Investigation of NanoFin Effect (nFE) for investigating the anomalous properties of nanofluids.*

IISc B: ME@75 RFC - *CFD simulation on the flow of Graphene-Ag/water nanofluid through hexagonal microchannel heat sink*

ICFTES 2022 - *CFD Study of Graphene Oxide-Water nanofluid flow through a hexagonal microchannel heat sink*

ICRAMEN 2021 - *Simulation-based Study of Graphene-water Nanofluid flow through Microchannel Heatsink*

PROJECT WORK

Building Energy Consumption Simulation *Energy Management in Commercial Buildings*

Nov 2022 – Dec 2022

- Developed a spreadsheet-based simulation tool capable of computing various building loads (transmission, conduction, solar, electric, and occupant) for a campus building (1537 WFES) by employing a zone-based approach. Using user input, the tool predicts the combined sensible and latent loads, allowing it to estimate annual heating and cooling energy usage.
- Analyzed HVAC system of the facility with zone approach and computed an initial simulation error, 31 MMBTU per day
- Calibrated the simulation model using 2021 real-time data and reduced the final error to 11 MMBTU/day

Simulation of shock-particle interactions using various numerical schemes *CFD*

Nov 2022 – Dec 2022

- Solved the shock tube, Lax problem using upwind flux vector splitting, Lax - Wendroff and flux corrected transport schemes.

Nanofluids and their applications to energy systems *Two - Phase Flow and Heat Transfer*

Apr 2024 – May 2024

- Conducted a literature review on nanofluids with focus on evolution, synthesis, characterization and properties.
- Extensively discussed the applications of nanofluids in various energy platforms- nuclear energy, geothermal energy, automotive systems, space exploration platforms, etc.

AWARDS & ACCOLADES

J. Mike Walker '66 Department of Mechanical Engineering

Pioneer Natural Resources Fellow

TX, United States

Aug 2023 – Aug 2024

- Presented with a fellowship awarded to a full - time graduate student with good academic standing and research contributions.

EXTRA CURRICULAR ACTIVITIES

Entrepreneurship Development Cell, IEST Shibpur *Member*

Sep 2018 – May 2022

- Speaker Acquisition Lead at Scintillations 2020 - the annual E - Summit of IEST Shibpur
- Editorial Team Member of Chrysalis 2019 - the annual magazine of EDC IEST

TECHNICAL SKILLS

Ansys Fluent, Autodesk Fusion 360, Design-of-experiments, ImageJ, JMP, LabVIEW, MATLAB, SolidWorks, Microsoft Office, Optical Profilometry, Python, Scanning Electron Microscopy, Stylus Profilometry