DEEP CHATTERJEE

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ACADEMIC BACKGROUND

Jadavpur University (2018-22)

Bachelor of Engineering (B.E.) with Honours in Mechanical Engineering   CGPA: 9.22/10 (86.39%)

St. Stephen's School (2018)

Senior Secondary (I.S.C) :Science with Biology   Marks Scored:566 out of 600 (94.3%)

St. Stephen's School (2016)

Secondary (I.C.S.E)   Marks Scored:576 out of 600 (96%)

EXPERIENCE

Neptune Laboratory, Jadavpur University

Project: Magnetohydrodynamics (MHD), Supervisors: **Prof. Nirmal Kumar Manna and Prof. Nirmalendu Biswas**

- Modelled the Navier-Stokes equation in dimensionless form using COMSOL Multiphysics for differentially heated cavities employing the Boussinesq approximation, assuming low magnetic Reynolds number and negligible Joule heating

- Explored different boundary conditions and Prandtl number of working fluid to simulate fluid flow in the presence of an external magnetic field for a range of Rayleigh number and Hartmann number values

- Derived values of average Nusselt number and total entropy generation in the cavity

Microfluidics Laboratory, Jadavpur University

Project: Electrohydrodynamics (EHD), Supervisor: **Prof. Sandip Sarkar**

- Implemented the Maxwell equations and the Navier Stokes equation in dimensional form in creating a model to investigate time dependent leaky dielectric droplet deformation behaviour (prolate or oblate) in the presence of an electric field, using the phase field method

- Calculated the Taylor deformation for a range of electric permittivity and electric conductivity values and compared the simulation results with Taylor's analytical solution

- Conducted a parametric study with twin droplets for a range of electrical conductivity and permittivity ratios to study the coalescence behaviour assuming the droplet fluid to be non Newtonian in nature

Undergraduate Research Intern, Jadavpur University

Project: Mixed Convection scale analysis, Supervisors: **Prof. Koushik Ghosh** and **Prof. Sandip Sarkar**

- Simulated mixed convection flow over a vertical flat plate kept at a constant temperature

- Extracted local and average values of scaled skin friction coefficient and Nusselt number for a range of Richardson number values at different values of Prandtl number

GET Intern, Tata Metaliks Ltd. (June 2021- August 2021)

Project: Prediction of remaining Life of Gearbox using vibration signals, Guide: **Tushar Kanti Mandal**
- Did a survey on existing models being used to detect gearbox failure at the plant and looked into the type of past vibration data available
- Proposed the use of Degradation Model in the short term and Similarity Model in the long term to predict gearbox RUL
- To demonstrate the feasibility of employing the Similarity Model, used MATLAB Simulink to create a gearbox model adding an induced gear tooth fault and a casing (modeled by a spring-mass damper system) which converted angular displacement of the input and output shaft to linear displacement of the casing. Sensors were used to collect the final vibration reading.
- Trained the Residual Similarity Model using the vibration data acquired and used a test case to calculate RUL

GET, Hindalco Industries Limited (Sept 2022-March 2023)

- Developed an understanding of various steps involved in the Bayer's process of refining alumina from bauxite
- Practically understood different processes such as bauxite crushing, grinding, digestion, precipitation, calcination etc.
- Studied about the practical challenges encountered in a refinery during steady state operation

Independent Project

- Eliminated the pressure term from Navier-Stokes equations using the stream function vorticity method
- Discretized the modified governing equations using finite difference method
- Assuming stream function at boundaries to be 0 and calculating vorticity boundary conditions in terms of stream function expressions, developed a C++ code to model the fluid flow and calculate the Nusselt number value
- Extracted the streamline and isotherm contours using Tecplot

PUBLICATIONS

- Chatterjee, D., Biswas, N., Manna, N.K., Sarkar, S. (2022), "Effect of discrete heating-cooling on magneto-thermal-hybrid nanofluidic convection in cylindrical system", International Journal of Mechanical Sciences, 238(10):107852

- Mandal, J., Chatterjee, D., Sarkar, S. (2023), "Binary coalescence of non-Newtonian droplets under an electric field: A numerical study", Physics of Fluids, 35 (3)

- Chatterjee, D., Biswas, N., Manna, N.K., Mandal, D.K., Chamkha, A.J. (2023) , "Magneto-nanofluidic flow in cylinder embedded discretely heated-cooled annular thermal systems: Conjugate heat transfer and thermodynamic irreversibility" Journal of Magnetism and Magnetic Materials, 569, 170442

- Chatterjee, D., Manna, N.K., Mandal, D.K., & Biswas, N. (2021), "Effect of partial magnetic field on thermo gravitational convection in an inclined cavity", IOP Conference Series: Materials Science and Engineering, 1080

- Chatterjee, D., Manna, N.K., & Biswas, N. (2021), "Thermo-magnetic convection of nanofluid in a triangular cavity with a heated inverted triangular object", Materials Today: Proceedings.

- Chatterjee, D., Biswas, N., Manna, N.K., Mandal, D.K. (2022), "Effect of Bottom Wall Curvature on Thermal Convection of Air/Nanofluid in a Differentially Heated Cavity Subjected to a Magnetic Field", Recent Advancements in Mechanical Engineering, Select Proceedings of ICRAME 2021