Gaurav Hedau

Mechanical Engineering (Thermal)

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Research Interest: - Boiling, Microchannel heat sink, Electronics cooling, Two-phase flow instabilities, Solar thermal.

Examination/Degree	University	Institute	Year	CPI / %
Doctorate	IIT Bombay	IIT Bombay	2021	8.0
Post-Graduation	IIT Jodhpur	IIT Jodhpur	2013	8.18
Graduation	J.N.V.U.	M.B.M. Engineering College, Jodhpur	2011	71.19
Intermediate/+2	C.B.S.E	St. Paul's School, Jodhpur	2007	85.40
Matriculation	R.B.S.E	Central Academy, Jodhpur	2005	85.33

Post PhD Experience: -

- Postdoctoral fellow at IIT Bombay from July 2021 to Feb 2022

Research Publications

Journal Articles

1. **Gaurav Hedau**, Prasenjit Dey, Rishi Raj and Sandip K. Saha (2020), Combined effect of inlet restrictor and nanostructure on two-phase flow performance of parallel microchannel heat sinks, *International Journal of Thermal Sciences*, 153, 106339.
2. **Gaurav Hedau**, Prasenjit Dey, Rishi Raj and Sandip K. Saha (2020), Experimental and numerical investigation of the effect of number of parallel microchannels on flow boiling heat transfer, *International Journal of Heat and Mass Transfer*, 158, 119973.
3. **Gaurav Hedau**, Rishi Raj and Sandip K. Saha (2021), Effect of Outlet Plenum Design on Flow Boiling Heat Transfer in Microchannel Heat Sinks, *Thermal Science and Engineering Progress*, 23, 100868.
4. **Gaurav Hedau**, Rishi Raj and Sandip K. Saha (2022), Complete Suppression of Flow Boing Instability in Microchannel Heat Sinks using a Combination of Inlet Restrictor and Flexible Dampener, *International Journal of Heat and Mass Transfer*,182, 121937.
5. **Gaurav Hedau**, Rishi Raj and Sandip K. Saha (2023), On the importance of fluidic manifold design and orientation on flow boiling instability in microchannel heat sink, *International Journal of Heat and Mass Transfer*, 209, 124120.
6. Prasenjit Dey, **Gaurav Hedau** and Sandip K. Saha (2019), Experimental and numerical investigations of fluid flow and heat transfer in a bioinspired surface enriched microchannel, *International Journal of Thermal Sciences*, *135*, 44-60.
7. Gagan Kewalramani, **Gaurav Hedau**, Sandip K. Saha and Amit Agrawal (2019), Study of laminar single phase frictional factor and Nusselt number in In-line micro pin-fin heat sink for electronic cooling applications, *International Journal of Heat and Mass Transfer*, *138*, 796-808.
8. Gagan Kewalramani, **Gaurav Hedau**, Sandip K. Saha and Amit Agrawal (2019), Empirical correlation of laminar forced convective flow in trapezoidal microchannel based on experimental and 3D numerical study, *International Journal of Thermal Sciences*, *142*, 422-433.
9. Gagan Kewalramani, **Gaurav Hedau**, Sandip K. Saha and Amit Agrawal (2020), Effect of short pin fin with different shapes and arrangements on thermal resistance of micro heat sink, *Journal of Enhanced Heat Transfer*, *27*(6) 491-503.
10. Sheetal Pandya, Shubhankar Gurav, **Gaurav Hedau**, Sandip K. Saha and Amit Arora (2020), Effect of axial conduction in integral rough friction stir channels: experimental thermo-hydraulic characteristics analyses, *Heat and Mass Transfer*, 56(6), 1725-1738.

Conference Proceeding, Presentations

1. **Gaurav Hedau**, Durga Prasad Ghosh, Deepak Sharma, Alwin Varghese, Rishi Raj and Sandip K. Saha (2017), Effect of nanostructured microchannel on flow boiling instability. In *Proceedings of the 24th*

National and 2nd International ISHMT-ASTFE Heat and Mass Transfer Conference (IHMTC-2017) December, 27-30, 2017, BITS Pilani, Hyderabad, India. **(Presented but not published)**

2. **Gaurav Hedau**, Rishi Raj and Sandip K. Saha (2020). Effect of outlet plenum volume during flow boiling inside plain parallel microchannel. In *Proceedings of the 5th World Congress on Momentum, Heat and Mass Transfer (MHMT'20) October, 14-16, 2020, Lisbon, Portugal (Virtually online)*.
3. Gagan Kewalramani, **Gaurav Hedau**, Sandip K. Saha and Amit Agrawal (2019). Experimental Comparison of Thermal Resistance for Micro pin fin heat sinks with different shapes and arrangement. In *Proceedings of the 25th National and 3rd International ISHMT-ASTFE Heat and Mass Transfer Conference (IHMTC-2019). Begel House Inc. December 28-31, 2019, IIT Roorkee, Uttarakhand, India.*

Key Projects

Ph.D. Project

Design innovation of microchannel heat sink for suppression of two-phase flow boiling instabilities.

Investigating the effectiveness of the design modification in microchannel heat sink by reducing backflow and enhancing rewetting of microchannel wall during two-phase heat transfer. The key highlights of the project are:

- Experimental and numerical investigation of the effect of the number of parallel microchannels on flow boiling.
- Implementing and analysing the individual and combined effect of nanostructured surface and inlet restrictor during two-phase flow boiling inside microchannel heat sink.
- Effect of volume of outlet plenum on flow boiling heat transfer in microchannels.
- Effect of flexible dampener along with inlet restrictor for complete suppression of two-phase flow instabilities.
- Comparison of different techniques used to suppress instability and their efficacy at different conditions during flow boiling in the microchannel.

Master of Technology Thesis:

Environmental degradation of glass fiber reinforced nanocomposites with carbon nanotubes as secondary reinforcement in polymer matrix for wind turbine blade application.

The composite's properties change due to environmental conditions like humidity and temperature which causes damage and reduction in properties in composites. The objective of the thesis is to analyse damage in fiber-reinforced composites with CNT as reinforcement to increase the durability and strength of wind turbine material.

Technical Skills

Experimental: Designing and fabrication of leakproof close flow loop. Experienced in machining with Drilling, Milling machine and CNC Micro milling machine. Know-how of making heaters for experiment purposes like preheater or strip heaters with nichrome wire according to wattage required and power source available.

Numerical/Modelling/Software: Modelling of a two-phase heat transfer problem in ANSYS-Fluent, MATLAB, LabVIEW, LaTeX, SOLIDWORKS, C Language.

Achievements/Awards/Extra-Curricular Activities

- Science story got selected among the best 100 entries of popular science stories for Augmenting Writing Skills for Articulating Research (**AWSAR Award 2019**).
- Won medals in the Swimming competition in Hostel general championship (inter-hostel) and PG general championship (inter-department) organized at IIT Bombay.
- Took part in Swimathon-2017 (12 hrs of swimming) and Half Marathon

Position of responsibilities

- Volunteer in 2nd Mechanical Engineering Graduate Research Symposium (MEGRES), IIT Bombay, 2015.

Teaching Assistance

- *Courses assisted* – Thermodynamics, Advance Heat Transfer, Computation Fluid Dynamics, Conduction and Radiation, Heat Transfer Laboratory.