

# Indian Institute of Technology Patna

## Application for the Faculty Position

Advertisement Number : IITP-FACREC-2023-NOV-02

Date of Application : 2024-03-16

Post Applied for : Professor

Department : Mechanical Engineering

Application Number : 0000000006



## 1. Personal Details

<b>First Name</b>		<b>Middle Name</b>		<b>Last Name</b>	
Manabendra				Pathak	
<b>Date of Birth</b>	<b>Gender</b>	<b>Marital Status</b>	<b>Category</b>	<b>Nationality</b>	<b>ID Proof</b>
01/01/1984	Male	Married	UR	Indian	AADHAR
<b>Father's Name</b>		Pathak			
<b>Current Address</b>			<b>Permanent Address</b>		
Dr. Manabendra Pathak R 209, Block III Dept. of Mechanical Engineering Indian Institute of Technology Patna			Dr. Manabendra Pathak R 209, Block III Dept. of Mechanical Engineering Indian Institute of Technology Patna		
Kanpa Road, Bihta Patna			Kanpa Road, Bihta Patna		
Bihar			Bihar		
India			India		
801103			801103		
<b>Mobile</b>			+91-612-302 8047		
<b>Alternate Mobile</b>					
<b>Landline Phone No.</b>					
<b>E-mail</b>			profile1@gmail.com		
<b>Alternate E-mail</b>			mpathak@iitp.ac.in		

## 2. Educational Qualifications

### (A) Ph. D. Details

<b>University/ Institute</b>	<b>Department</b>	<b>Name of Ph. D. Supervisor</b>	<b>Year of Joining</b>	<b>Date of successful thesis Defence</b>	<b>Date of Award</b>
IIT Guwahati	Mechanical	xxx	2004	16/03/2002	31/05/2007
<b>Title of Ph. D. Thesis</b>		xxx			

### (B) Academic Details - PG

Degree	University/ Institute	Subjects	Year of Joining	Year of Graduation	Duration (in years)	Percentage/CG PA	Division /Class
M.Tech.	IIT Guwahati	Fluid/Thermal	2000	2002	2 Years	95%	Div A

### (C) Academic Details - UG

Degree	University/ Institute	Subjects	Year of Joining	Year of Graduation	Duration (in years)	Percentage/C GPA	Division /Class
B.E.	Assam Engineering College	Mechanical	1997	2000	3 Years	95	Div A

### (D) Academic Details - School

10th/12th/HSC/Diploma	School	Year of Passing	Percentage/CG PA	Division/Class
12th/HSC/Diploma	Assam District School	1997	95	Div A
10th	Assam District School	1995	95	Div A

### (E) Additional Educational Qualifications (If any)

Degree	University/ Institute	Subjects	Year of Joining	Year of Graduation	Duration (in years)	Percentage/CG PA	Division /Class
CSE	IIT Patna	AI	2023	2024	1 Years	9	Div A

## 3. Employment Details

### (A) Present Employment

Position	Organization/Institution	Date of Joining	Date of Leaving	Duration (in years)
Professor	IIT Patna	Central Govt.	03/01/2009	17/03/2024

### (B) Employment History (After PhD)

Position	Organization/Institution	Date of Joining	Date of Leaving	Duration (in years)
More than 3 years teaching experience(Post Phd) <b>Yes</b>				

### (C) Teaching Experience (After PhD)

Position	Employer	Course Taught	UG/PG	No. of Students	Date of Joining	Date of Leaving	Duration
Assistant Professor	Technion Israel Institute of Technology	Chemical Engineering	PG	60	05/01/2007	06/12/2009	1 years 7 months
Staff	IIT Guwahati	Mechanical	PG	60	02/01/2	05/08/2	0 years

Member		Engineer			009	009	1 months
Proffesor	IIT Patna	ME110: ME Workshop I (2011, 2012, 2013) ME204: Fluid Mechanics I (2013, 2014, 2015) CE205: Fluid Mechanics and Hydraulics (2014) ME206: Fluid Mechanics II (2015, 2016) ME211: Machine Drawings (2009) ME212: Mechanical Engineering Lab I (2010, 2011, 2012)	PG	500	03/01/2009	16/04/2024	15 years 0 months

#### (D) Research Experience

Position	Institute	Supervisor	Date of Joining	Date of Leaving	Duration
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#### (E) Industrial Experience

Organization	Work Profile	Date of Joining	Date of Leaving	Duration
M.T.I. (Pvt) Ltd	Design Engineer	03/01/2009	04/01/2009	0 years 1 months

#### 4. Area(s) of Specialization and Current Area(s) of Research

<b>Area(s) of Specialization</b>	Fluid Mechanics, Heat and Mass Transfer, Sustainable Energy Research Laboratory (SERL)
<b>Current Area(s) of Research</b>	Computational fluid dynamics and heat transfer Turbulence modeling Two-phase flow in micro and minichannels Dispersion of particles, droplets and bubbles at micro- and nano-scales Rheological and heat transfer characteristics of viscoplastic fluids Nuclear materials Solar thermal technology

#### 5. Summary of Publications

Number of International Journal Papers	81
Number of National Journal Papers	81
Number of International Conference Papers	61
Number of National Conference Papers	61
Number of Patent(s)	2
Number of Book(s)	9
Number of Book Chapter(s)	2

#### 6. List of 10 Best Research Publications (Journal/Conference)

**(A) Journals(s)**

S. No.	Author(s)	Title	Name of Journal	Year, Vol., Page	Im pact Factor	DOI	Status
1	P. Kumar and M. Pathak	Effect of High Viscosity Ratio on Pressure Profile Evolution in Microfluidic T-Junction	25th National and 3rd International I SHMT-ASTFE Heat and Mass Transfer Conference (I HMTC-2019), IIT Roorkee	28-30 December 2019	-	978-981-15-0124-1_118	Granted
2	R.K. Gouda, A. Ranjan, M. Pathak, and M.K. Khan	Combined effect of structured surface and biosurfactant in pool boiling heat transfer enhancement	International Journal of Heat and Mass Transfer	2024, Vol. 221, 125102	-	978-981-19-6970-6	Published
3	A. Priy, I. Ahmad, M.K. Khan and M. Pathak	Bubble interaction and heat transfer characteristics of microchannel flow boiling with single and multiple cavities	ASME Journal of Thermal Sciences and Engineering Applications	2024	-	978-981-19-6970-6	Published
4	S. Das, N. Verma, M. Pathak, and S. Bhattacharyya,	Heat Transfer Enhancement in Solar Receiver Tube Using Porous Media	4th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, 2019(HEFAT2019), Wicklow, Ireland	22-24, July 2019	-	978-981-19-6970-6	Granted
5	A. Ranjan, M. Pathak and M.K. Khan	Pool Boiling Heat Transfer Characteristics of a Plasma Sprayed Coated Surface	7th International and 45th National Conference on Fluid Mechanics and Fluid Power	10-12 December 2018	-	978-981-19-6970-6	Granted

**7. List of Patent(s), Book(s), Book Chapter(s)****(A) Patent(s)**

S. No.	Inventor(s)	Title of Patent	Country of Patent	Patent Number	Date of Filing	Date of Published	Status Filed/Published/Granted
1	S. Raj, A. Shukla, M. Pathak, M.K. Khan	Stepped microchannel heat sink for cooling an electronic device		502819	Thu Feb 01 2024	Thu Feb 01 2024	Granted
2	A. A. Patel, M. Pathak, A. Ali	Hybrid solar tracking system for a solar collector and method thereof		521830	Thu Mar 07 2024	Thu Mar 07 2024	Granted

**(B) Book(s)**

S. No.	Author(s)	Title of the Book	Year of Publication	ISBN
1	Y. K. Prajapati, M. Pathak and M.K. Khan	Performance analysis of uniform and expanding cross-section microchannels for single phase and flow boiling heat transfer, Fluid Mechanics and Fluid Power - Contemporary Research, Springer	2017	978-81-322-2741-0
2	A. M. Sharan, M. Pathak and M. Verma	An Analytical Investigation of Solar Water Heater Performance During Winter Period in Jharkhand Region, Advances in Mechanical Engineering, Springer	2020	978-981-15-0123-4
3	I. Ahmad, M. Pathak, and MK Khan	Electrowetting Induced Dynamics of Microdroplet Oscillation, Fluid Mechanics and Fluid Power (Vol. 2),	2023	978-981-19-6970-6

**(C) Book Chapter(s)**

S. No.	Author(s)	Title of the Book Chapter	Year of Publication	ISBN
1	M. Pathak	Chapter 19, Numerical simulation of droplet dynamics in membrane emulsification systems, Numerical Simulation- From Theory to Industry	2012	978-953-51-0749-1
2	M. Pathak	Chapter 5: Nanoemulsions and their stability for enhancing functional properties of food ingredients,	2017	978-0-12-811042-6

Nanotechnology Applications in Food: Flavor, Stability, Nutrition and Safety, ELSEVIER

## 8. Google Scholar Link

**URL** <https://scholar.google.com/citations?user=jolH7LAAAAAJ&hl=en>

## 9. Membership of Professional Societies

### Details

S. No.	Name of the Professional Society	Membership Status (Lifetime/Annual)
1	Indian Society for Heat and Mass Transfer (ISHMT)	Lifetime
2	National Society of Fluid Mechanics and Fluid Power (NSFMFP)	Lifetime
3	American Society of Mechanical Engineers (ASME)	Annual
4	Society of Automotive Engineers India (SAE India)	Annual
5	American Society of Thermal and Fluids Engineers (ASTEF)	Annual

## 10. Professional Training

### Details

S. No.	Type of Training Received	Organisation	Year	Duration
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## 11. Award(s) and Recognition(s)

### Details

S. No.	Name of Award	Awarded By	Year
1	National merit scholarship	Govt. of India	1999
2	International travel grant from Department of Science & Technology	Govt. of India	2014
3	Post-doctoral fellowship	Technion Israel Institute of Technology	2009

## 12. Research Supervision

### (A) PhD Thesis Supervision

S. No.	Name of Student/Research Scholar	Title of Thesis	Role	Ongoing/Completed	Ongoing Since/Year of Completion
1	Dr. Yogesh Kumar Prajapati	Twophase flow investigations in different microchannel configurations	Supervisor with Co-supervisor	Completed	2024
2	Dr. Md Ashique Hassan	Natural convection of viscoplastic fluids in an enclosure	Supervisor with Co-supervisor	Completed	2024
3	Akash Priy	Flow boiling instability	Supervisor	Ongoing	2018

			with Co-supervisor		
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**(B) M.Tech/M.E./Master's Thesis Supervision**

S. No.	Name of Student/Research Scholar	Title of Thesis	Role	Ongoing/Completed	Ongoing Since/Year of Completion
1	Vivek Karn	Flow and heat transfer characteristics of inclined dual jets	Supervisor with Co-supervisor	Completed	2023
2	Shubham Saurav	Lift and drag characteristics of flapping wing	Supervisor with Co-supervisor	Ongoing	2022

**(C) B.Tech/B.E./Bachelor's Project Supervision**

S. No.	Name of Student	Title of Project	Role	Ongoing/Completed	Ongoing Since/Year of Completion
1	Prateek and Anush	Optimizing microchannel heat sink design using machine learning	Supervisor with Co-supervisor	Ongoing	2020
2	Rajan and Sakshi	Thermal management of EV	Supervisor with Co-supervisor	Ongoing	2020

**13. Sponsored Projects/ Consultancy Details**

**(A) Sponsored Projects**

S. No.	Sponsoring Agency	Title of Project	Sanctioned Amount	Period	Role	Status
1	Board of Research in Nuclear Sciences, DAE, Govt. of India	Influence of Hydrogen Content on Burst Characteristics of Zircaloy-4 Cladding	26.645 Lacs	Current	Ongoing	Co-investigator
2	Science and Engineering Research Board, DST, Govt. of India	A self-adaptive electronic cooling system by enhanced pool boiling	36.25 Lacs	2 years 6 months	Completed	Principal Investigator

**14. Significant research contribution and future plans**

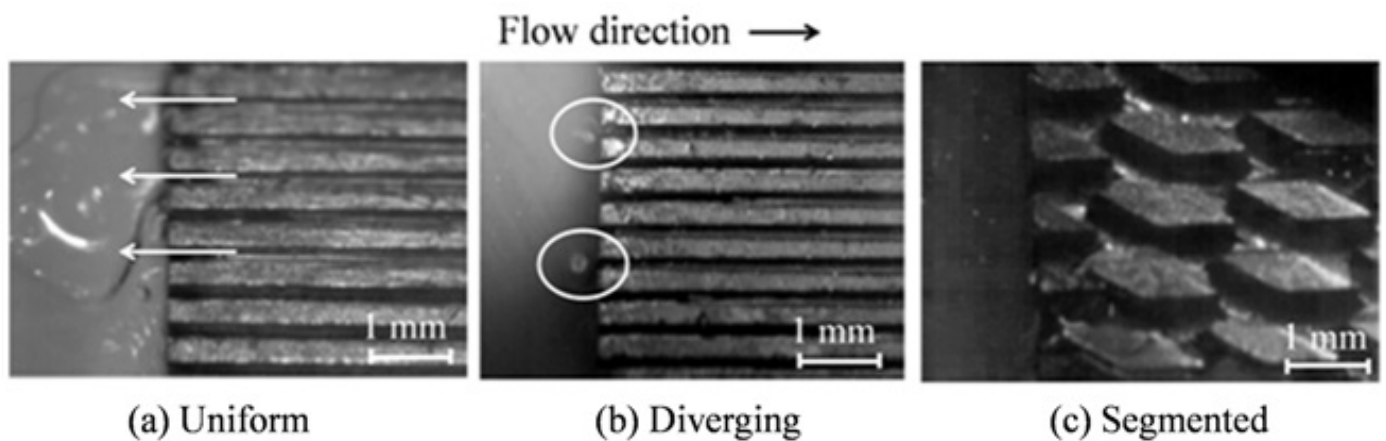
## Flow boiling in microchannels

In recent years, power density in electronic devices has been drastically raised due to increase in system's operating frequency, interconnect resistance, package densities and decrease in physical



size of the components. This has led to high heat generation in the device and quickly reaching a high temperature which cannot be cooled down by present package-level cooling techniques using air as coolant. Further two-phase evaporative flow or flow boiling in microchannels is more effective than the single phase flow due to involvement of latent heat in the process. High heat removal using low coolant flow rate and temperature uniformity in the channels are two favourable characteristics of two-phase cooling technique. However during flow boiling, growing bubbles restrict the flow of coolant in confined microchannels and impose the back flow of the coolant. This results the increase and fluctuation of temperature, pressure causing instability and poor heat transfer. Efforts have been made by our group to reduce the flow instability by incorporating geometric modifications of the microchannels. Two-geometric variations i.e. diverging and segmented finned microchannels are experimentally investigated for reducing flow boiling instability in microchannels.

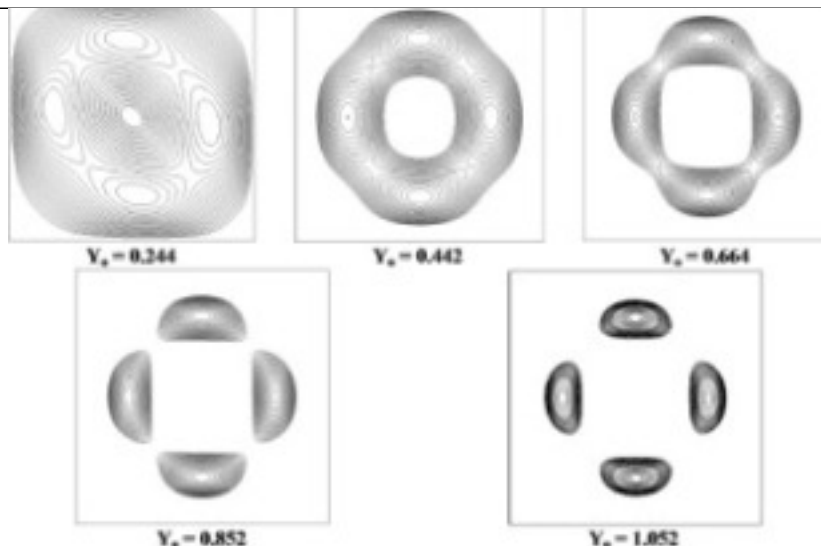
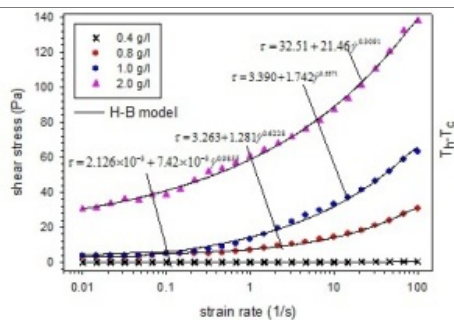
In parallel with experimental work, development of analytical/numerical model for investigating bubble growth and bubble dynamics in flow boiling, are in progress.



## 15. Significant teaching contribution and future plans

### Thermorheological Behavior of Viscoplastic Fluids

Viscoplastic fluids are special kind of non-Newtonian fluids which behave like solids under applied stress below a critical stress known as yield stress. They behave like fluids once applied stress exceeds yield stress. Convection in viscoplastic fluids has scientific relevance owing to its widespread applications ranging from food, chemical and cosmetic industries to natural phenomena like flow of lava and mud. The heat transfer mechanism in these processes affects the temperature distribution and evolution of yielded zones which in turn control the qualities like appearance, taste and durability of final products. Both experimental and numerical investigations on natural convection of viscoplastic fluids for different boundary conditions have been performed. Thermorheological characterization of viscoplastic gels and their behaviour in Rayleigh-Benard convection have been investigated. Numerical models with thermorheological data have been developed. Investigations have facilitated the understanding of thermal instability, onset of convection, evolving shape and size of yielded and unyielded zones, existence of sharp boundary between yielded and unyielded regions and movement of plugged region etc.



## 16. Any other relevant information

### Student guidance at design competition

Faculty adviser of SUPRA IITP team from 2014 onward. SUPRA is a competition for engineering students which involves designing, manufacturing of a Formula One racing car followed by participating in a racing competition. The competition is organized by SAE India.

## 17. Professional Service as Reviewer/Editor etc.

### Editorial Board Memberships

ISST Journal of Mechanical Engineering (IJME)

Journal of Mechanical Engineering and Automation

Scientific Committee & Editorial Review Board of Engineering and Physical Sciences, World Academy of Science, Engineering and Technology

## 18. Detailed List of Journal Publications

(Including Sr. No., Author's Names, Paper Title, Volume, Issue, Year, Page Nos., Impact Factor (if any), DOI, Status [Published/Accepted])

### Journal Publications

81. A. Priy, I. Ahmad, M.K. Khan and **M. Pathak**, 2024, Bubble interaction and heat transfer characteristics of microchannel flow boiling with single and multiple cavities, ASME Journal of Thermal Sciences and Engineering Applications, (Accepted).

## 19. Detailed List of Conference Publications

(Including Sr. No., Author's Names, Paper Title, Name of the conference, Year, Page Nos., DOI [If any])

## Conference Publications

P. Kumar and **M. Pathak**, 2019, Effect of High Viscosity Ratio on Pressure Profile Evolution in Microfluidic T-Junction, 25th National and 3rd International ISHMT-ASTFE Heat and Mass Transfer Conference (IHMTTC-2019), IIT Roorkee, 28-30 December 2019

R. Gouda, **M. Pathak** and M.K. Khan, 2019, Combined Effects of Structured Surfaces and Surfactant in Pool Boiling Heat Transfer Enhancement, 25th National and 3rd International ISHMT-ASTFE Heat and Mass Transfer Conference (IHMTTC-2019), IIT Roorkee, **28-30 December 2019**

## 20. Reprints of 5 Best Research Papers- Attached

## 21. Check List of the documents attached with the online application

PHD\_Certificate.pdf

PG\_Certificate.pdf

UG\_Certificate.pdf

12th\_HSC\_Diploma.pdf

10th\_SSC\_Certificate.pdf

10\_Years\_Post\_PHD\_Experience\_Certificate.pdf

Any\_Other\_Document.pdf

## 22. Referees

### Details of Referees

Name	Position	Association with Referee	Institution/ Organization	E-mail	Contact No.
Dr. Mohd. Kaleem Khan	Profeesor	Colleague	IIT Patna	__@g.c	1234567890

## 23. Final Declaration

I hereby declare that I have carefully read and understood the instructions and particulars mentioned in the advertisement and this application form. I further declare that all the entries along with the attachments uploaded in this form are true to the best of my knowledge and belief

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Signature of Applicant