Dr. BITTAGOPAL MONDAL

IUSSTF Research Fellow

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Present Address	Permanent Address
MS-I, A-2 **CMERI Colony** **Durgapur - 713209** **West Bengal**	**Vill. – Dhulai** **P.O. – Gopikantapur** **Dist. – Bankura** **West Bengal – 722 207**

Education

- **Doctor of Philosophy (Ph.D.)** – Completed on July, 2008, from the **Department of Mechanical Engineering**, **Indian Institute of Technology Guwahati, Assam, India**. Title of Thesis: Application of the lattice Boltzmann method in solving energy equations of heat transfer problems involving thermal radiation. Supervisor: **Prof. Subhash C. Mishra**.

- **Master of Engineering (M.E.)** –First Class, Percentage of marks 78.11 with specialization of Fluid Mechanics, from the **Department of Applied Mechanics, Bengal Engineering and Science University, Shibpur, Howrah - 711103**, **West Bengal, India**. Title of Thesis: Analysis of Hydraulic Transients in a Pipe Network with Some Control Devices. **Supervisor: Prof. S. Talapatra**.

- **Bachelor of Technology (B. Tech.)** –First Class, Percentage of marks 71.47. **Department of Mechanical Engineering, Kalyani Govt. Engineering College, Kalyani University, West Bengal, India**. Title of B.Tech Project: Design of a Condenser for a Thermal Power Plant. **Supervisor: Prof. P.S. Banerjee**.

Areas of Interest

- Conjugate Mode Heat Transfer-Conduction, Convection and/or Radiation.
- Fluid Mechanics and Computational Fluid Dynamics.
- Water management in GDL/Gas flow channels of a PEM Fuel Cell.
- Thermal management of Li-Ion battery pack used for electric vehicle.
- Two Phase Flow, Nano-fluids and Heat and Mass Transfer in Porous Media.
- Lattice Boltzmann Method, Finite Volume Method

Post PhD Research Experience: (77 + 19) Months = 08Years

- Working as Scientist at CSIR - Central Mechanical Engineering Research Institute (CSIR - CMERI), Durgapur, India (http://www.cmeri.res.in/) since June 2010. Presently, I focus my research work on **thermal analysis of beam stopper, implementation of rotating catcher and cooling system for battery thermal management system (BTMS)**. I am also carrying out some fundamental studies on the **lattice Boltzmann method, conduction/convection and radiation, two phase flow, nano fluids, computational fluid dynamics and simulation of fluid flow and heat transfer over bluff bodies**. Beside these, I am deeply involved with very good interesting projects on **water management in PEM fuel cell which involves two phase flows in porous medium, fluid-fluid and fluid-solid interaction etc.**

- Awarded **IUSSTF Research Fellowship Program (**a prestigious fellowship under Indo-US Science & Technology Forum) to visit the Department of Mechanical Engineering at Texas A & M University, College Station for one year (**Feb 17, 2014 – Feb 16, 2015**). The research work was completed on "**Efficacy of Nanofluids for Thermal Management in Lithium-Ion Battery Systems**".

- **Postdoctoral Fellowship** (PDF) - I was working as a **Postdoctoral Fellow** at the Dept. of Mechanical and Mechatronics Engineering at **University of Waterloo**, Waterloo, Ontario, **Canada** (Nov 2008 – May 2010). Project Title: **Simulation of water droplet removal from the gas flow channel of a PEM fuel Cell.** Supervisor: **Prof. Xianguo Li**.

- Worked as a Research Associate on the project related to **Nanofluids** at the Department of Mechanical Engineering, **University of Pretoria**, Pretoria, **South Africa**, during **May 2008-July 2008**.

- Completed a project entitled" **Analysis of radiation effects due to localized fire in 3-D tunnel environment using the lattice Boltzmann method**" during a period of 4 months (**August-November 2006)** at **Politecnico Di Torino,** Turin, **Italy**.

Computational Skills

- Programming with FORTRAN 90, Familiar with C, C++.
- Windows operating system, Tecplot 360, Origin, Gnuplot etc.
- Software Packages: Gambit 2. 4. 6, ANSYS – FLUENT 12.0.7, STAR CCM+ and Battery Design Studio (BDS), LS-Dyna.

Associated with the Projects:

1. **Feasibility Study of Graphene Based PCM Cooling for Battery Thermal Management System, Principle Investigator, OLP-212012, Project Cost: 8 lacs, Duration: 09/2016 to 08/2017 (Ongoing).**

2. **Design of Beam Stoppers for Super-FRS in FAIR Project,** As **Co-Investigator, GAP 098212, Project Cost: 219.75 Lacs, Duration: 3 Years (Ongoing).**

3. **Development of underground coal gasification technology in India(CoalGasUrja): Mathematical Modeling and Simulation Studies of Underground Coal Gasification (UCG) Process**, As **Co-Investigator,** CSIR, Project No: NWP ESC0302, **Project Cost: 85.90 Lacs, Duration: 10/2012 to 03/2017(Ongoing).**

4. **Simulation of Water Droplet Mobility in Gas Flow Channels of PEM Fuel Cell using the Lattice Boltzmann Method** under SERC Fast Track Scheme for Young Scientist- (Engineering Sciences) at Department of Science and Technology,(**GAP-182712**), **Principle Investigator, DST, Project Cost: 13.02 Lacs, Duration: 06/2012 to 05/2016 (Completed**).

5. **Numerical Study of Water Droplet Mobility in Serpentine Gas Flow Channels of PEM Fuel Cell** for possible award of grant from the Laboratory Project Grants Scheme (**OLP-161212**), **Principle Investigator, Institute Project, Project Cost: 26.00 lacs, Duration: 04/2011 to 09/2013(Completed).**

List of Publications

International Journals: 33-Published, 01-Accepted.

(Citations: 485, h-index: 13, i10-index: 19)

(https://scholar.google.co.in/citations?user=iyjf1-YAAAAJ&hl=en&oi=ao)

1. B. Mondal, P. P. Mukherjee, "Modeling the Wettability and Compression Implications on the Flooding Behavior in the PEFC Gas Diffusion Layer" Journal of Power Sources (**To be Submitted very soon**).

2. B. Mondal, C. F. Lopez,P. P. Mukherjee, "Exploring the Efficacy of Nanofluids for Thermal Management in Lithium-Ion Battery Systems", International Journal of Heat and Mass Transfer (**To be Submitted very soon**).

3. C. F. Lopez, B. Mondal, P. P. Mukherjee**,** "Introduction of Vortex Generators for Thermal Management in Lithium-Ion Battery Systems", International Journal of Heat and Mass Transfer (**To be Submitted very soon**).

4. C. F. Lopez, B. Mondal, P. P. Mukherjee**,** "Lithium-Ion Battery Thermal Management: a Comprehensive Overview and Perspective", Energy Conversion and Management (**To be Submitted very soon**).

5. D. Chatterjee, S. Patra, **B. Mondal,** Mixed convective transport around staggered rows of square cylinders, **Journal of Energy, Heat and Mass Transfer**, **(Submitted).**

6. D. Chatterjee, K. Chatterjee, **B Mondal**, N. Hui, Unconfined hydromagnetic flow and heat transfer around a circular cylinder at low Reynolds numbers, **CFD Letters** (**Accepted**).

7. **B. Mondal**, D. Chatterjee, Numerical investigation of the water droplet transport in a PEM fuel cell with serpentine flow channel, **Journal of Applied Fluid Mechanics**, 9(3), 1057-1071, **2016.**

8. S. Biswas, P. Sharma, **B. Mondal**, G. Biswas, Analysis of Mixed Convective Heat Transfer in Ribbed Channel Using Lattice Boltzmann Method, **Numerical Heat Transfer Part A,** 68(1), 75-98, **2015**, IF: 2.492.

9. D. Chatterjee, **B. Mondal**, Effect of thermal buoyancy on fluid flow and heat transfer across a semicircular cylinder in cross flow at low Reynolds numbers, **Numerical Heat Transfer Part A,** 67 (4), 436-453**, 2015,** IF: 2.492.

10. S. K. Gupta, D. Chatterjee, **B. Mondal**, Investigation of Mixed Convection in a Ventilated Cavity in presence of a Heat Conducting Circular Cylinder, **Numerical Heat Transfer Part A,** 67 (1), 52-74**, 2015,** IF: 2.492.

11. D. Chatterjee, **B. Mondal,** Mixed Convection heat transfer from an equilateral triangular cylinder in cross flow at low Reynolds number, **Heat Transfer Engineering,** 36, 123-133, **2015,** IF: 0.932.

12. D. Chatterjee, S. K. Gupta, **B. Mondal**, Mixed convective transport in a lid-driven cavity containing a nanofluid and a rotating circular cylinder at the center, **International Communication in Heat and Mass Transfer,** 56, 71-78, **2014,** IF: 1.982

13. D. Chatterjee, **B. Mondal**, Control of flow separation around bluff obstacles by superimposed thermal buoyancy, **International Journal of Heat and Mass Transfer** 72, 128-138, **2014,** IF: 2.407, Cited by-1.

14. D. Chatterjee, **B. Mondal,** P Halder**,** Hydromagnetic mixed convective transport in a vertical lid driven cavity including a heat conducting rotating circular cylinder, **Numerical Heat Transfer Part A**, 65, 48-65, **2014**, IF: 2.492, Cited by-5.

15. D. Chatterjee, K. Chatterjee, **B. Mondal**, N. Hui, Wall confined flow and heat transfer around a square cylinder at low Reynolds and Hartmann numbers, **Heat Transfer-Asian Research,** 43 (5), 459-475, **2014**.

16. S. K. Gupta, D. Chatterjee, **B. Mondal**, Magnetohydrodynamic flow and heat transfer around a circular cylinder in an unconfined medium, **International Journal of Advancements in Mechanical and Aeronautical Engineering – IJAMAE,** 1, 102-106, **2014.**

17. R. Djebali, **B Mondal**, Comments on "A generalized lattice Boltzmann method for three-dimensional incompressible fluid flow simulation" by Ahmad Reza Rahmati and Mahmud Ashrafizaadeh, **CFD Letters**, 5 (4), 193-196, **2013.**

18. D. Chatterjee, **B. Mondal,** Unsteady mixed convection heat transfer from tandem square cylinders in cross flow at low Reynolds numbers, **Heat and Mass Transfer,** 49, 907-920, **2013**.

19. D. Chatterjee, **B. Mondal,** P. Halder**,** Unsteady forced convection heat transfer over semicircular cylinder at low Reynolds numbers, **Numerical Heat Transfer Part A,** 63, 411-429, **2013,** IF:2.492, Cited by-4.

20. D. Chatterjee, **B. Mondal,** Mixed convection heat transfer from tandem square cylinders for various gaps to size ratios, **Numerical Heat Transfer Part A,** 63, 101-119, **2013**, Cited by-3.

21. D. Chatterjee, K. Chatterjee, **B. Mondal,** Control of flow separation around bluff obstacles by transverse magnetic field, **Journal of Fluids Engineering Transactions (ASME)**, 134, 091102-1, **2012**, IF:1.121, Cited by-2.

22. D. Chatterjee, **B. Mondal,** On the vortex shedding mechanism behind a circular cylinder subjected to cross buoyancy at low Reynolds numbers, **Computational Thermal Sciences**, 4(1), 23-38, **2012**, Cited by-8.

23. D. Chatterjee, **B. Mondal,** Forced convection heat transfer from an equilateral triangular cylinder at low Reynolds numbers, **Heat and Mass Transfer,** 48, 1575-1587**, 2012**, IF: 0.673, Cited by- 3.

24. **B. Mondal**, D. Chatterjee, Lattice Boltzmann simulation of heat conduction problems in non-isothermally heated enclosures, **Heat Transfer - Asian Research,** 41 (2), 127-144, **2012**, Cited by-1.

25. D. Chatterjee, **B. Mondal,** Effect of Thermal Buoyancy on the two-dimensional Upward Flow and Heat Transfer around a Square Cylinder, **Heat Transfer Engineering**, 33 (12), 1063-1074, **2012**, IF: 0.932, Cited by-8.

26. D. Chatterjee, **B. Mondal,** Forced convection heat transfer from tandem square cylinders for various spacing ratios, **Numerical Heat Transfer Part A** 61, 381-400, **2012**, IF: 2.492, Cited by-2.

27. K. A. Raman, **B. Mondal**, X. Li, Water droplet transport in single gas flow channel of PEM fuel cell, **International Journal of Advances in Thermal Sciences and Engineering,** 27-33, **2011**.

28. D. Chatterjee, **B. Mondal,** Effect of thermal buoyancy on vortex shedding behind a square cylinder in cross flow at low Reynolds number, **International Journal of Heat and Mass Transfer** 54, 5262-5274, **2011**, IF: 2.407, Cited by-21.

29. **B. Mondal**, K. Jiao, X. Li, Three dimensional simulation of water droplet movement in PEM fuel cell flow channels with hydrophilic surfaces, **Int. J. Energy Research**, 35, 1200-1212, **2011**, IF: 2.418,Cited by-17.

30. **B. Mondal**, X. Li, Effects of volumetric radiation on natural convection in a square cavity using lattice Boltzmann method with non-uniform lattices, **International Journal of Heat and Mass Transfer,** 53 (21-22), 4935-4948, **2010**, IF: 2.407, Cited by-17.

31. **B. Mondal**, S. C. Mishra, Simulation of natural convection in the presence of volumetric radiation using the lattice Boltzmann method and the finite volume method, **Numerical Heat Transfer, Part A,** 55: 18-41, **2009**, IF: 2.492, Cited by-44.

32. **B. Mondal**, S. C. Mishra, Analysis of 3-D conductive-radiative transfer using LBM and FVM on non-uniform lattices, **Journal of Thermophysics and Heat Transfer,** 23(1): 210-216, **2009**, IF: 0.658 Cited by-4.

33. **B. Mondal**, S.C. Mishra, Numerical analysis of solidification of a 3-D semitransparent medium in presence of volumetric radiation, **International Journal of Thermal Sciences**, 48 (6), 1116-1128, **2009**, IF: 2.142, Cited by-9**.**

34. S. C. Mishra**, B. Mondal,** T. Kush, B.S.R. Krishna, Solving transient heat conduction problems on uniform and non-uniform lattices using the lattice Boltzmann method, **International Communications in Heat and Mass Transfer**, 36 (4), 322-328, **2009**, IF: 1.982, Cited by-18.

35. **B. Mondal**, S. C. Mishra, Lattice Boltzmann method applied to the solution of the energy equations of the transient conduction and radiation problems on non-uniform lattices**, International Journal of Heat and Mass Transfer,** 51, 68-82, **2008,** IF: 2.407, Cited by- 27.

36. **B. Mondal**, S. C. Mishra, P. Asinari, R. Borchiellini, Analysis of a localized fire in a 3-D tunnel using a hybrid solver: Lattice Boltzmann method, finite volume method and fully explicit upwind scheme, **Numerical Heat Transfer, Part A**, 53 (4): 392-417, **2008, IF: 2.492, Cited by-12.**

37. **B. Mondal**, S.C. Mishra, The lattice Boltzmann method and the finite volume method applied to conduction-radiation problems with heat flux boundary conditions,

International Journal for Numerical Methods in Engineering, 78(2): 172-195, **2008**, IF: 1.928, Cited by-12.

38. S. C. Mishra, T. B. Pavan Kumar, **B. Mondal,** Lattice Boltzmann method applied to the solution of energy equation of a radiation and non-fourier heat conduction problem, **Numerical Heat Transfer, Part A,** 54: 798-818, **2008**, IF: 2.492, Cited by-34.

39. **B. Mondal**, S. C. Mishra, Application of the lattice Boltzmann method and discrete ordinate method for solving transient conduction and radiation heat transfer problems, **Numerical Heat Transfer, Part A**, 52 (8): 757-775, **2007**, IF: 2.492, Cited by-21.

- **National Journal: 1-Published.**

40. D Chatterjee, **B Mondal,** K. Chatterjee, Influences of thermal buoyancy on the vortex shedding mechanisms behind a heated circular cylinder at low Reynolds numbers, **The Bulletin of Engineering and Science**, 4 (1), 40-48, **2012**.

- **International Conference – 15-Published**

1. S. K. Gupta, D. Chatterjee, **B. Mondal**, Forced convection heat transfer around a rotating square cylinder in an infinite medium, **22st National & 11th International ISHMT-ASME Heat and Mass Transfer Conference, Dec. 28-31, 2013, IIT Kharagpur, India**.

2. D. Chatterjee, **B. Mondal**, G. Biswas, Low-dimensional chaos for flow past staggered rows of square cylinders, **Energy System Modeling and Optimization Conference (ESMOC 2013), December 9-11, 2013, NIT Durgapur, India.**

3. S. K. Gupta, D. Chatterjee, **B. Mondal**, Magnetohydrodynamic flow and heat transfer around a circular cylinder in an unconfined medium, **Future Trends In Structural, Civil, Environmental and Mechanical Engineering – FTSCEM,** Bangkok, Thailand, 13-14 July 2013.

4. P. Sharma, **B. Mondal**, G. Biswas, Flow and Heat Transfer Characteristics in Ribbed Channel using Lattice Boltzmann Method, **ASME 2013 Summer Heat Transfer Conference**, Minneapolis, USA, 14-19 July 2013.

5. D. Chatterjee, **B. Mondal,** G. Biswas, Vortex degeneration due to thermal buoyancy effect for upward flow around bluff obstacles, **21st National & 10th ISHMT-ASME Heat and Mass Transfer Conference, IIT Madras, 27-30 December 2011.**

6. **B. Mondal**, D. Chatterjee, Md. Raja, Water droplet transport simulation in serpentine gas flow channel of PEM fuel cell, **11th Asian International Conference on Fluid Machinery, 21-23 November 2011, IIT Madras, India**.

7. K. A. Raman**, B. Mondal**, Water droplet mobility in gas flow channel of PEM fuel cell, **ICAME-5, 5-7 June 2011, SVNIT Surat, Gujrat, India.**

8. **B. Mondal**, K.Jiao, X.Li, Numerical study of effects of wettability on water droplet transport in the flow channels of PEM fuel cells, **5th International Green Energy Conference (IGEC-V)**, **1-3 June 2010, University of Waterloo, Canada.**

9. **B. Mondal**, E. A. Ramadan, X. Li, S. C. Mishra, Free Surface Simulation of Water Droplet Falling with and without Gravity Effect using the Lattice Boltzmann Method, **20th National & 9th ISHMT-ASME Heat and Mass Transfer Conference, IIT Bombay, 4-6 January 2010.**

10. **B. Mondal**, S. C. Mishra, X. Li, Analysis of Natural convection in the Presence of Volumetric Radiation in a Square Cavity with Non-Uniform Lattices Using the Lattice Boltzmann Method, **20th National & 9th ISHMT-ASME Heat and Mass Transfer Conference, IIT Bombay, 4-6 January 2010.**

11. **B. Mondal**, S. C. Mishra, Analysis of Transient Conduction and Radiation Heat Transfer with Flux boundary condition using the Lattice Boltzmann Method and Finite Volume Method, **19th National & 8th ISHMT-ASME Heat and Mass Transfer Conference, Hyderabad 3-5 January 2008**.

12. **B. Mondal**, S. C. Mishra, Analysis of Solid-Liquid Phase Transition in 3-D Semitransparent Medium using Lattice Boltzmann Method and Finite Volume Method, **19th National & 8th ISHMT-ASME Heat and Mass Transfer Conference, Hyderabad 3-5 January 2008**.

13. **B. Mondal**, S. C. Mishra, Analysis of 3-D transient conduction-radiation heat transfer problems using lattice Boltzmann method and finite volume method, **19th National & 8th ISHMT-ASME Heat and Mass Transfer Conference, Hyderabad 3-5 January 2008**.

14. **B. Mondal**, S. C. Mishra, Analysis of 1-D transient conduction and radiation heat transfer using the variable relaxation time lattice Boltzmann method and the finite volume method, **13th International Heat Transfer Conference, 13-18 August 2006, Sydney, NSW, Australia**.

15. **B. Mondal**, S. C. Mishra, Application of variable relaxation time lattice Boltzmann method in 2-D transient conduction and radiation heat transfer problems, **International Congress on Computational Mechanics and Simulation (ICCMS- 06), 8-10 December 2006, IIT Guwahati, India, Vol. 2, pp. 1877-1883.**

- **National Conference – 1-Published**

16. **B. Mondal**, P. Halder, D. Chatterjee, Hydromagnetic Mixed Convection in a Vertical Lid-Driven Cavity including a Heat Conducting Rotating Circular Cylinder, **National**

conference on Mechanical Engineering: Retrospect and Prospect (NCMERP), 2-3 February 2013, BIET, Suri, W.B., India.

- **Symposium – 1-Published**

17. S. C. Mishra, **B. Mondal**, Lattice Boltzmann method - A new CFD tool to handle fluid flow and heat transfer problems, as a Keynote Paper in **Indo-Australian Workshop on "A CFD Approach on Fluid Flow, Heat and Mass Transfer and Symposium on "CFD Applications in Multidisciplinary Areas, IIT Roorkee, 12-14 April 2007**.

Membership of Professional Bodies

1. **The Electrochemical Society (ID: 363672)**

2. **Indian Society for Heat and Mass Transfer (ISHMT) - Life Member (ID-942)**

Award

- **Indo-US Research Fellowship** Sponsored by Indo-US Science & Technology Forum (IUSSTF), Visiting Texas A & M University, USA, **Feb. 17, 2014 – Feb.16, 2015**.

Conference, Workshop and Mini-Symposium Attended

1. 18th National & 7th International ISHMT-ASME Heat and Mass Transfer Conference, January 4-6, 2006, Indian Institute of Technology Guwahati, Assam, India.

2. International Congress on Computational Mechanics and Simulation (ICCMS- 06), 8-10 December 2006, Indian Institute of Technology Guwahati, Assam, India.

3. Indo-Australian Workshop on "A CFD Approach on Fluid Flow, Heat and Mass Transfer and Symposium on "CFD Applications in Multidisciplinary Areas, IIT Roorkee, 12-14 April 2007.

4. 19th National & 8th International ISHMT-ASME Heat and Mass Transfer Conference, January 3-5, 2008, JNTU, College of Engineering, Hyderabad, India.

5. 6th International conference on Heat Transfer, Fluid Mechanics and Thermodynamics (HEFAT), 30 June- 02 July, 2008, University of Pretoria, Pretoria, South Africa.

6. APMA-AUTO21 Annual Conference and Exhibition, May 26 - 28, 2009, Hamilton Convention Centre, Hamilton, Ontario, Canada.

7. Mini-symposium on “Prospect of Nuclear Power in India”, IIT Gandhinagar, Gandhinagar, March 12, 2011.

8. 225th ECS meeting, Orlando, USA, 11-15 May 2014.

Invited Talk

"Water droplet transport in serpentine gas flow channels of PEM fuel cell" in **Workshop on "Computational Transport Mechanics, CSIR-CMERI, 03 January 2012**.

Training

1. Entrepreneurship training program at HRDC, Ghaziabad during July 26-31, 2010

Other Activities

1. Very closely associated with the organization of 18th National & 7th ISHMT-ASME Heat & Mass Transfer Conference at IIT Guwahati during January 04-06, 2006.

2. Organized the Indo-German Winter Academy 2012 at CSIR-CMERI Durgapur during December 11-17, 2012.

Reviewer of Journal & Conferences

Journals

1. Journal of Thermophysics and Heat Transfer.
2. International Journal of Thermal Sciences
3. Numerical Heat Transfer.
4. Heat and Mass Transfer.
5. Heat Transfer Engineering.
6. Engineering Applications of Computational Fluid Mechanics.
7. Applied Mathematics and Information Sciences.
8. Sadhana - Academy Proceedings in Engineering Science.
9. AIP Advances
10. Alexandria Engineering Journal

Conferences

11. ISHMT/ASME Heat and Mass Transfer Conference.

12. ASME International Mechanical Engineering Congress & Exposition (IMECE).

13. Heat Transfer, Fluid Mechanics and Thermodynamics (HEFAT).

References

1.	2.
Dr. Subhash C. Mishra (PhD Thesis Supervisor) Professor Dept of Mechanical Engg. IIT Guwahati, Guwahati-781039 Assam, India. Email: scm@iitg.ernet.in Phone: +913612582660 Fax: +91-361-2690762 http://www.iitg.ernet.in/scm/	**Dr. Dipankar Chatterjee** (Reporting Officer at parent Institute) Senior Scientist & HOD Simulation & Modelling Laboratory CSIR-Central Mechanical Engineering Research Institute. M. G. Avenue, Durgapur-713209 Burdwan, West Bengal, India. Email: rsdchat@yahoo.co.in : d_chatterjee@cmeri.res.in Phone:+91343 6510455 Fax: +91343 2548204 http://www.cmeri.res.in
3.	**4.**
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