Prashant K. Jain

Oak Ridge National Laboratory
Oak Ridge, TN 37831-6170
• E-Mails: jainpk@ornl.gov (work), pkj0um@gmail.com (personal)
• Phone: 865-278-6400 (cell) • Citizenship: USA • Clearance: Q (in process)
• Profile: https://www.ornl.gov/staff-profile/prashant-k-jain
• Citations: https://scholar.google.com/citations?user=nvr-hUUAAAAJ

Profile

Dr. Prashant Jain is the interim Section Head for the Advanced Reactor Engineering and Development Section in the Nuclear Energy & Fuel Cycle Division at Oak Ridge National Laboratory. Prashant received his MS (2006) and Ph.D. (2010) in nuclear engineering from the University of Illinois, Urbana-Champaign, and his BTech (2004) in mechanical engineering from the Indian Institute of Technology, Bombay. He has over 15 years of experience in advanced multi-physics modeling, nuclear thermal design and safety analyses, computational fluid dynamics (CFD), single- and two-phase turbulent flows and heat transfer, analytical benchmarks, lattice Boltzmann method, and parallel scientific software development. At ORNL, he leads the development of advanced three-dimensional multi-physics design and safety basis models for the present highly enriched uranium core and the proposed low-enriched uranium core designs of the High Flux Isotope Reactor (HFIR). He also served as an R&D analyst for the Spallation Neutron Source (SNS) Proton Power Upgrade project and its Second Target Station (STS) design project. He was also the principal developer of the ORNL's lattice Boltzmann method CFD code, PRATHAM, and the thermo-fluidics thrust lead for the Transformational Challenge Reactor (TCR) project. He has also led multiple industry CRADAs (with Eaton Corporation, Gopher Resource, Alcoa USA, Linde Corporation, and Spar Energy) for the DOE's High-performance Computing for Energy Innovation Program. Prashant is a recipient of the American Nuclear Society (ANS) Mark Mills Award for his doctoral research on lattice Boltzmann methods and UT-Battelle's 2019 Mission Support Award for his contributions towards the HFIR event causal analysis.

Education

- **Ph.D. in Nuclear Engineering,** $2006-2010$
  University of Illinois, Urbana-Champaign
- **M.S. in Nuclear Engineering,** $2004-2006$
  University of Illinois, Urbana-Champaign
- **Bachelor of Technology in Mechanical Engineering,** $2000-2004$
  Indian Institute of Technology, Bombay, INDIA

Work Experience

Interim Section Head $2022-\text{present}$
Advanced Reactor Engineering & Development
Nuclear Energy & Fuel Cycle Division, ORNL

- Responsible for providing technical leadership for 50+ research and technical staff in the Advanced Reactor Engineering & Development Section to realize scientific and technical breakthroughs that help extend the lives of current nuclear plants; further modeling and simulation capabilities for nuclear applications; deliver new insights into nuclear fuel performance at all stages of the fuel cycle; and provide innovations for nuclear fuel systems—current and future.

Group Leader $2020-2022$
Thermal-Hydraulics Group
Nuclear Energy & Fuel Cycle Division, ORNL

- Responsible for new business growth and program development efforts to sustain a group of 13 research professionals and advance the group through securing an R&D funding of $4 million per annum.
- Served as an immediate supervisor for staff members in the Thermal Hydraulics group. Encouraged staff to "think and dream big," take appropriate risks in their

work, and develop skills that enable them to pursue new ideas, scientific passions, and research programs.
- Supported group members by consistently reviewing technical products such as proposals, publications, and artifacts to ensure high quality and consistency with ORNL standards.
- Built strong teams across ORNL. Integrated program development activities with other line and program managers and collaborated to assemble the best available teams and technical resources for each project.
- Identified strategic staffing needs for the NEFCD Thermal Hydraulics group. Attracted a quality, diverse pool of top candidates and hired staff members who stay committed to world-class R&D and aspire to be the best in their field.
- Thermofluidic Thrust Lead – Transformational Challenge Reactor (TCR) Project
- Multiphysics CFD Lead – HFIR LEU Conversion Program
- Principal Investigator – HPC4Manufacturing Projects, Digital Twin Assessment for the Nuclear Regulatory Commission
- Contributor – ARPA-E INTEGRATE, SNS Proton Power Upgrade, SNS Second Target Station Projects

Thermal-Hydraulics Team Lead $\qquad$ 2018 − 2020
Advanced Reactor Engineering Group
Reactor and Nuclear Systems Division, ORNL
- Established multi-physics research capabilities for nuclear applications to benefit from advancement in high-performance computing technologies. Led and supervised a team of staff scientists, engineers, and postdoctoral candidates to advance research in CFD and nuclear systems safety analysis. Successfully expanded existing research efforts and assisted group leader in recruiting a high-quality, diverse pool of qualified candidates for the team.

Nuclear Computational Fluid Dynamics Engineer $\qquad$ 2012 − 2018
Thermal Hydraulics and Irradiation Engineering Group
Reactor and Nuclear Systems Division, ORNL
- Led the development of advanced multi-physics modeling and simulation capabilities for the HFIR low-enriched uranium conversion project under the DOE National Nuclear Security Administration Office of Material Management and Minimization.
- Served as an independent safety reviewer for the Plutonium-238 production program sponsored by the National Aeronautics and Space Administration.
- Responsible for performing independent safety reviews for the low-flow qualification of HFIR beam tubes and numerous other material irradiation tests and experiments using advanced CFD simulations.
- Supported proposal and program development activities for the ORNL seed money and laboratory-directed R&D programs, nuclear energy advanced modeling and simulation program, nuclear regulatory commission, advanced manufacturing office, nuclear energy university program, nuclear safety research and development program, and high-performance computing for manufacturing program.
- Supported development of a high-temperature capable centrifugal pump technology for molten salt reactors through advanced CFD simulations.

Postdoctoral Research Associate $\qquad$ 2010 − 2012
Thermal Hydraulics and Irradiation Engineering Group
Reactor and Nuclear Systems Division, ORNL

- Led the development of an ORNL lattice Boltzmann method code, PRATHAM, Parallel Thermal Hydraulics using Advanced Mesoscopic Methods.
- Led the development of a parallel Cartesian mesh generator code, CartGen++, for high-performance computing applications.
- Supported DOE Fukushima accident analysis efforts using exploratory hydrogen explosion simulations through time-dependent, explicit finite element methods in LS-DYNA and computational fluid dynamics simulations using COMSOL Multiphysics and STAR-CCM+.
- Developed and published infinite-series exact analytical solutions for a variety of multi-layer heat conduction problems.

Summer Research Internships $2006 - 2009$
- Idaho National Laboratory (2008, 2009)
    Supported developing an advanced utility toolkit to enable multi-variable couplings between different neutronics and thermal-hydraulics code systems.
- Argonne National Laboratory (2007)
    Guest graduate appointment to collaborate on developing an advanced multiphase lattice Boltzmann code package.
- Oak Ridge National Laboratory (2006)
    Coupled ATHENA (Advanced Thermal Hydraulic Energy Network Analyzer) code with the National Institute of Standards and Technology Reference Property Database to include cryogenic and other fluid properties.

Graduate Research Assistant $2004 - 2010$
Nuclear Plasma and Radiological Engineering
University of Illinois, Urbana-Champaign
- Developed a parallel two-phase dynamics simulation toolkit using the lattice Boltzmann method to improve fundamental understanding of nuclear boiling water reactor applications.
- Developed a flow-stability analysis code to predict flow instabilities in a natural circulation loop with supercritical water and CO_2 fluids.

Technical Skills
- Experienced nuclear safety professional with a specific focus on advanced multi-physics software and technology for high-fidelity modeling and simulation of nuclear systems.
- Expert in industry-leading computational fluid dynamics technologies, including COMSOL Multiphysics, STAR-CCM+, and ANSYS Workbench.
- Expert in many programming and scripting languages, including Fortran 90, C, C++, Python, Perl, and MATLAB.
- Expert in parallel programming paradigms, including Message Passing Interface – MPI, OpenMP, and knowledgeable in GPU-based code acceleration methods, CUDA, and OpenCL on leadership computing facilities.
- Experience with other engineering tools and packages, including ATHENA, RELAP5, Pro-ENGINEER, SpaceClaim, LS-DYNA, MATLAB, Mathematica, VisIt, ParaView, and Tecplot.

Awards and Honors
- **Invited Panelist for the VaiBhaV Summit**   2020
    Invited to participate in the Government of India's Vaishwik Bharatiya Vaigyanik (VaiBhaV) Summit, which was a collaborative initiative by S&T and Academic Organizations of India, to bring out the comprehensive roadmap to leverage the

expertise and knowledge of global Indian researcher for solving emerging challenges.

- **UT–Battelle Mission Support Award**   2019
  For outstanding performance and dedication in determining the causes of the first fuel element failure in 52 years of HFIR operation.
- **ORNL Significant Event Award**   2012
  Nuclear Science and Engineering Directorate at ORNL conferred this award to recognize significant project accomplishments in developing Plutonium-238 production capabilities at the High Flux Isotope Reactor.
- **COMSOL Best Paper Award**   2012
  Paper on design and safety basis simulations for Pu-238 bare pellet irradiation was selected as the best paper for COMSOL's annual conference in Boston in 2012.
- **ORNL Significant Event Award**   2011
  Reactor and Nuclear Systems Division at ORNL conferred this award in recognition of significant contributions to the support of DOE in response to the nuclear crisis at Fukushima.
- **ORNL Appreciation Award**   2011
  Reactor and Nuclear Systems Division at ORNL conferred this award to recognize and appreciate my substantial role in computational analysis activities related to the ORNL's response to the events at Fukushima Daiichi.
- **American Nuclear Society – Mark Mills Award**   2010
  This is a national award given each year by the American Nuclear Society (ANS) to recognize a graduate student author who submits the best original technical paper contributing to advancing science and engineering related to the atomic nucleus.
- **Member of the Alpha Nu Sigma National Honor Society**   2006
- **Sargent and Lundy Fellowship**   2005 − 2006

Professional Activities

- Member of the American Nuclear Society, since 2006.
    Thermal-Hydraulics, and Mathematics and Computations Divisions.
    Session Organizer and Session Chair for ANS annual meetings.
- Member of the American Society of Mechanical Engineers.
- Panelist for the National Science Foundation GRFP Program.
- Associate Editor for the Frontiers in Energy Research (Nuclear Energy).
- Technical reviewer for
    International Journal of Heat and Mass Transfer
    International Journal of Thermal Sciences
    Nuclear Engineering and Design
    Journal of Nuclear Technology
    Annals of Nuclear Energy
    ASME/JSME 8th Thermal Engineering Joint Conference
    Journal of Advances in Engineering Education
    U.S. Dept of Energy – Nuclear Energy University Program
    U.S. Dept of Energy – Small Business Innovation Research Program
    ORNL Innovation Crossroads Program.

Proposals and Partnerships

- Led successful research proposals for
    DOE NNSA – Material Management and Minimization (M3) Program Office
    DOE NE – NEAMS High-Impact Problem Research and NEUP Programs
    DOE – Advanced Research Projects Agency (ARPA-E) Program
    DOE – EERE High-Performance Computing for Manufacturing Program

U.S. Nuclear Regulatory Commission – Office of Nuclear Regulatory Research
ORNL – Seed Money Program
ORNL – Lab-directed Research and Development Program
NRC – Assessment of Digital Twins for Advanced Reactors

- Industrial partnerships with

United Technologies Research Center (UTRC)	Alcoa USA
Electric Power Research Institute (EPRI)	Wenesco LLC
Gas Technology Institute (GTI)	First Solar
MetalTek International	Gopher Resource
Eaton Corporation	Praxair, Inc
HolosGen LLC	X-energy
GE Renewable Energy (Hydro)	Spar Energy
Westinghouse LLC	Linde Corporation

- Academic and research collaborations with

  Indian Institute of Technology, Bombay India
  University of Illinois, Urbana-Champaign IL
  Kansas State University, Manhattan KS
  University of Michigan, Ann Arbor MI
  University of Tennessee, Knoxville TN
  University of Missouri, Rolla MO
  Texas A&M University, College Station TX
  Virginia Commonwealth University, Richmond VA
  Argonne National Laboratory, Lemont IL
  Idaho National Laboratory, Idaho Falls ID
  Institut Laue–Langevin (High-Flux Reactor), Grenoble, France
  Technical University of Munich, Research Neutron Source (FRM II), Germany

Publications: Book and Journal Articles

1. D. J. Kropaczek, V. Badalassi, P.K. Jain, P. Ramuhalli, W.D. Pointer. Digital Twins for Nuclear Power Plants and Facilities. Book Chapter. To be submitted in: The Digital Twin Technology, Business Models, Operations and Applications, Springer (2022).

2. M. Sitek, P.K. Jain et al., "Thermomechanical Analysis and Modeling of Involute-Shaped Fuel Plates Using the Cheverton-Kelley Experiments for the High Flux Isotope Reactor," Journal manuscript. To be submitted in: Nuclear Engineering and Design (2022).

3. J.M. Park, M. Cianciosa, K. Kim, E. Hassan, R. K. Archibald, R. W. Smith, M T. Kao, C. Daily, P.K. Jain. TokDesigner - A Theory-Based Design Tool for Fusion Reactors. To be submitted in: Nuclear Fusion (2022).

4. V.M. Rao, P.K. Jain et al., "Turbulent Gas Flows in Gyroid Topologies," Manuscript # JOT-2022-0054, Submitted to the Journal of Turbulence, (2022).

5. J. Weinmeister, C. Jesse, P.K. Jain, B.J. Ade, D. Schappel. Coolant Channel Design for Additively Manufactured Reactor Cores. Submitted in: Nuclear Science and Engineering (2022).

6. A. Wysocki, P.K. Jain, S. Bhatt, and J. Rader. Transformational Challenge Reactor Accident Analyses. Submitted in: Nuclear Science and Engineering (2022).

7. Z. Ahmed, P.K. Jain et al. Experimental investigation on the coolability of nuclear reactor debris beds using seawater. International Journal of Heat & Mass Transfer, 184, 122347 (2022).

8. N.S. Panicker, R. Chaudhary, V.M. Rao, M.O. Delchini, P.K. Jain. High-Fidelity Simulation Study of the Aluminum Smelting Process Using OpenFOAM. Metallurgical and Materials Transactions B, Volume 53B, pp. 2407-2426 (2022).

9. V.M. Rao, Vineet Kumar, A. Anderson, J. Grogan, P.K. Jain, "Computational Methodology to Simulate Pyrometallurgical Processes in a Secondary Lead Furnace," REWAS 2022: Developing Tomorrow's Technical Cycles (Volume 1), The Minerals, Metals & Materials Series (2022).

10. Brian J. Ade et al. Candidate Core Designs for the Transformational Challenge Reactor. Journal of Nuclear Engineering, 2, 74-85, 2021.

11. V. Kumar, M. Harvey, M. Wendel, P.K. Jain, N.J. Evans. Thermal loading analysis of the ring injection dump for the Spallation Neutron Source facility. Nuclear Inst. and Methods in Physics Research, A, 1006 (2021) 165380.
12. B.R. Betzler, B.J. Ade, A.J. Wysocki, P.K. Jain, P.C. Chesser, M.S. Greenwood, and K.A. Terrani. Transformational Challenge Reactor Pre conceptual Core Design Studies. Nuclear Engineering and Design, Vol. 367, 110781, 2020.
13. M. Sandlin, K. Nawaz, B. Fricke, V.M. Rao, C. Cramer, E.L. Curzio, A. Elliott, and P.K. Jain. An Overview of the Design of High-Temperature Heat Exchangers: State of the Art Developments and Prospects. Submitted to Renewable and Sustainable Energy Reviews, 2020.
14. D. Franken, D. Gould, P.K. Jain, H. Bindra. Numerical Study of Air Ingress Transition to Natural Circulation in a High-Temperature Helium Loop. In Press, Annals of Nuclear Energy, Vol. 111, January 2018.
15. C.J. Hurt, J.D. Freels, P.K. Jain, G.I. Maldonado. Thermo-Mechanical Safety Analyses of Preliminary Design Experiments for Pu-238 Production. In Press, ASME Journal of Nuclear Engineering and Radiation Science, 2017 (NERS-16-1069).
16. C.J. Hurt, J.D. Freels, P.K. Jain, G.I. Maldonado. Thermo-Mechanical Safety Analyses for Pu-238 Production Target at the HFIR. In Press, ASME Journal of Nuclear Engineering and Radiation Science, 2017 (NERS-16-1070).
17. S. Singh, P.K. Jain, Rizwan-uddin. Analytical Solution for Three-Dimensional, Unsteady Heat Conduction in a Multilayer Sphere. Journal of Heat Transfer, Paper 101301, Vol. 138, October 2016.
18. D. Wang, I.C. Gauld, G.L. Yoder, L.J. Ott, G.F. Flanagan, M.W. Francis, E.L. Popov, J.J. Carbajo, P.K. Jain, J.C. Wagner, J.C. Gehin. Study of Fukushima Daiichi Nuclear Power Station Unit-4 Spent Fuel Pool. Nuclear Technology, 180(2):205-215, 2012.
19. S. Singh, P.K. Jain, Rizwan-uddin. Finite Integral Transform Method to Solve Asymmetric Heat Conduction in a Multilayer Annulus with Time-Dependent Boundary Conditions. Nuclear Engineering and Design, 83(2):144-154, 2011.
20. P.K. Jain, S. Singh, Rizwan-uddin. An Exact Analytical Solution for Two-Dimensional, Unsteady, Multilayer Heat Conduction in Spherical Coordinates. International Journal of Heat and Mass Transfer, 53(9-10):2133-2142, 2010.
21. P.K. Jain, A. Tentner, Rizwan-uddin. A Lattice Boltzmann Framework to Simulate Boiling Water Reactor Core Hydrodynamics. Computers and Mathematics with Applications, 58(5):975-986, 2009.
22. P.K. Jain, S. Singh, Rizwan-uddin. Analytical Solution to Transient Asymmetric Heat Conduction in a Multilayer Annulus. Journal of Heat Transfer, 131(1):011304(1-7), 2009.
23. S. Singh, P.K. Jain, Rizwan-uddin. Analytical Solution to Transient Heat Conduction in Polar Coordinates with Multiple Layers in Radial Direction. International Journal of Thermal Sciences, 47(3):261-273, 2008.
24. P.K. Jain, Rizwan-uddin. Numerical Analysis of Supercritical Flow Instabilities in a Natural Circulation Loop. Nuclear Engineering and Design, 238(8):1947-1957, 2008.
25. P.K. Jain, Y. Gu, Rizwan-uddin. Broadcasting Engineering Laboratories, Audio/Video, and Data, in Real-Time over the Internet. Advances in Engineering Education, 1(2):1-17, 2008.

Publications: Technical Proceedings

1. A. Bergeron, P.K. Jain et al., "Updates from the Involute Working Group," European Research Reactors Conference (RRFM) 2022, Budapest, Hungary, June 2022.
2. B.J. Ade et al. Transformational Challenge Reactor Design Characteristics. International Conference on Physics of Reactors 2022 (PHYSOR 2022), Pittsburgh, PA, May 15–20, 2022.
3. N.S. Panicker, R. Chaudhary, M.O. Delchini, V.M. Rao, P.K. Jain. Large Eddy Simulation study of Aluminum Smelting process using OpenFOAM. 7th Thermal and Fluids Engineering Conference (Hybrid), Partially online virtual and in person at University of Nevada, Las Vegas, NV, USA, May 16-18, 2022.
4. P.K. Jain, J. Weinmeister, B.J. Ade. CFD Modeling for the Transformational Challenge Reactor Preliminary Design. International Topical Meeting on Nuclear Reactor Thermal Hydraulics (NURETH-19), Virtual Meeting, March 6–11, 2022.
5. I. Jarrah, M.O. Delchini, V. Badalassi, P.K. Jain, J. Gounley. Implementation of the Energy Equation Solver to the Lattice Boltzmann Method-based Code PRATHAM. International Topical Meeting on Nuclear Reactor Thermal Hydraulics (NURETH-19), Virtual Meeting, March 6–11, 2022.

6. J. Weinmeister, A.S. Sabau, P.K. Jain. Additively Manufactured Surface Heat Transfer Enhancements for the Transformational Challenge Reactor. To be published in: International Topical Meeting on Nuclear Reactor Thermal Hydraulics (NURETH-19), Virtual Meeting, March 6–11, 2022.

7. V.M. Rao, V. Kumar, A. Anderson, J. Grogan, P.K. Jain. Computational Methodology to Simulate Pyrometallurgical Processes in a Secondary Lead Furnace. To be published in: REWAS 2022 Symposia, TMS 2022 Annual Meeting & Exhibition, Anaheim, California, USA, February 27–March 3, 2022.

8. Casey J. Jesse, Justin Weinmeister, Prashant Jain, Brian Ade, "Flattening the Radial Temperature Profile across the Transformational Challenge Reactor Core," Transactions of 2021 ANS Winter Meeting and Technology Expo, Washington DC, November 2021.

9. B.J. Ade, P.K. Jain, J. Weinmeister, and B.R. Betzler. The Impact of Temperature Modeling Assumptions for the Transformational Challenge Reactor. In: Transactions of 2021 ANS Annual Meeting, June 13-16, 2021.

10. P.K. Jain and N. See. Advanced CFD and Multiphysics Design Exploration at ORNL. Presentation at the: Siemens' Digital Twin conference for the US Dept of Energy, April 21, 2021.

11. D. Chandler, J. L. Meszaros, B. R. Betzler, J. W. Bae, D. H. Cook, V. D. Fudurich, T. Howard, C. J. Hurt, G. Ilas, P. K. Jain, and E. L. Popov. Fuel Conversion Efforts at the High Flux Isotope Reactor–a 2020 Status Update. In: Transactions of 2020 ANS Winter Meeting and Nuclear Technology Expo, November 2020.

12. A. Wysocki, P.K. Jain, J. Rader. Transformational Challenge Reactor Accident Analysis. In: Transactions of 2020 ANS Winter Meeting and Nuclear Technology Expo, November 2020.

13. J. Weinmeister, C. Jesse, P.K. Jain. Gas Coolant Channel Optimization for Transformational Challenge Reactor. In: Transactions of 2020 ANS Winter Meeting and Nuclear Technology Expo, November 2020.

14. V.M. Rao, M. Delchini, P.K. Jain, and M.T. Ahmad. HPC to Enable Next-generation Low-temperature Waste Heat Recovery. Proceedings of the 2020 28th Conference on Nuclear Engineering, ICONE28-POWER2020, August 2-6, 2020, Anaheim, California, USA.

15. J. Weinmeister, P.K. Jain. Cooling Channel Optimization in Additively Manufactured Gas-Cooled Reactor Core. Research Summary. In: Transactions of American Nuclear Society Annual Meeting, June 2020.

16. P.K. Jain. Challenges and Opportunities in Thermal Hydraulics of High-Temperature Gas-Cooled Reactors. Technical Panel Discussion. In: Transactions of American Nuclear Society Annual Meeting, June 2020.

17. B. Betzler, B. Ade, A. Wysocki, P.K. Jain, S. Greenwood, J. Rader, J. Heineman, R. Kile, N. Brown, K. Terrani. Power Level Down-Selection for the Transformational Challenge Reactor. Research Summary. In: Transactions of American Nuclear Society Annual Meeting, June 2020.

18. N.S. Panicker, M. Delchini, T. Sambor, A.S. Sabau, and P.K. Jain. Advanced Thermal-Hydraulic Model of Heat Recovery Steam Generators. 5thThermal and Fluids Engineering Conference (TFEC), May 26-28, 2020.

19. P.K. Jain. Thermal-Hydraulics Modeling and Simulation Capabilities for Advanced Reactor Design and Safety Evaluations. Technical Presentation. In: 2019 Global Center for Nuclear Energy Partnership (GCNEP) Working Group Meeting, December 2019.

20. P.K. Jain. An Overview of Research on Molten Salt Reactors. Technical Presentation. In: 2019 Global Center for Nuclear Energy Partnership (GCNEP) Working Group Meeting, December 2019.

21. D. Chandler, B.R. Betzler, P.K. Jain, J.W. Bae, D.H. Cook, V.D. Fudurich, T.K. Howard, C.J. Hurt, G. Ilas, J.L. Meszaros, E. Popov. High Flux Isotope Reactor Conversion from High-Enriched to Low-Enriched Uranium Fuel – a 2019 Progress Update. Abstract and Presentation. In: Reduced Enrichment for Research and Test Reactors (RERTR) 2019 Meeting, Zagreb, Croatia, October 6-9, 2019.

22. T.K. Howard, P.K. Jain, and E.L. Popov. Verification and Validation of COMSOL for Heat Transfer in Thin Rectangular Channels using NASA Test Results. Research article. In: 18th International Topical Meeting on Nuclear Reactor Thermal Hydraulics, Portland, Oregon, August 18-23, 2019.

23. P.K. Jain. Renewed Emphasis on Advanced Modeling, Simulation, and Testing for the LEU Silicide Fuel in Response to the Recent HFIR Event. Technical Presentation. In: U.S. High-Performance Research Reactors (USHPRR) 2019 Meeting, July 2019.

24. P.K. Jain. High-Performance Computing to Enable Next-generation Low-temperature Waste Heat Recovery. ORNL CRADA NFE-18-07223. Technical Review Presentation for the U.S. DOE Advanced Manufacturing Office Program Review Meeting, Washington DC, June 11-12, 2019.

25. V.M. Rao, M. Delchini, M.T. Kao, P.K. Jain, and S. Subramanian. HPC to Enable Next-generation Low-temperature Waste Heat Recovery. Technical Poster for the U.S. DOE Advanced Manufacturing Office Program Review Meeting, Washington DC, June 11-12, 2019.

26. D. Renfro, B. Betzler, D. Chandler, D. Cook, V. Fudurich, C.J. Hurt, G. Ilas, P.K. Jain, E. Popov. Continuing LEU Conversion Activities at the High Flux Isotope Reactor. Abstract and Presentation. In: Reduced Enrichment for Research and Test Reactors (RERTR) 2018 Meeting, Edinburgh, U.K., November 4-7, 2018.

27. P.K. Jain. Improving Nuclear Safety Through Multiphysics Modeling and Simulations. Technical Poster. In: COMSOL Conference 2018, Boston, MA, October 3-5, 2018.

28. D. Renfro et al. Continuing LEU Conversion Activities at the High Flux Isotope Reactor. In: Transactions of Reduced Enrichment for Research and Test Reactors (RERTR 2017) Meeting, Chicago, IL, USA, November 12-16, 2017.

29. P.K. Jain, J.D. Freels, D.H. Cook, E.L. Popov, and D.G. Renfro. Advanced Multiphysics Computational Fluid Dynamics Models for the High Flux Isotope Reactor. In: Proceedings of RRFM-2017 (European Research Reactor Conference), Rotterdam, Netherlands, 14-18 May 2017.

30. J.J. Carbajo and P.K. Jain. Comparison of HFIR Core Hydraulic Models with Operational Data. In: Transactions of ANS Winter Meeting, Las Vegas, NV, November 6-10, 2016.

31. D. Renfro et al. Continuing LEU Conversion Activities at the High Flux Isotope Reactor. In: Transactions of Reduced Enrichment for Research and Test Reactors (RERTR 2016) Meeting, Antwerp, Belgium, October 23-26, 2016.

32. D. Renfro et al. Continuing LEU Conversion Activities at the High Flux Isotope Reactor. In: U.S. High-Performance Research Reactors (USHPRR) Working Group Meeting, Gaithersburg, MD, USA, July 2016.

33. P.K. Jain and J.D. Freels. Advanced Multiphysics Thermal-Hydraulic Models for the High Flux Isotope Reactor. In: Transactions of the COMSOL 2015 Conference, Boston, MA, USA, October 2015.

34. D. Renfro et al. Continuing LEU Conversion Activities at the High Flux Isotope Reactor. In: Transactions of Reduced Enrichment for Research and Test Reactors (RERTR 2015) Meeting, Seoul, South Korea, October 2015.

35. P.K. Jain and J.D. Freels. Advanced Multiphysics Thermal-Hydraulic Models for the High Flux Isotope Reactor. In: Nuclear Reactor Thermal Hydraulics (NURETH-16) Conference, Chicago, September 2015.

36. P.K. Jain. Learn from COMSOL Multiphysics: 25 must-have User-Centric features for any engineering analysis software. ORNL RNSD M&S Forum, July 2015.

37. D. Renfro et al. Continuing LEU Conversion Activities at the High Flux Isotope Reactor. In: U.S. High-Performance Research Reactors (USHPRR) Working Group Meeting, Argonne, IL, USA, June 2015.

38. P.K. Jain and J.D. Freels. 3D Multi-Physics Analyses to Support Low Enriched Uranium (LEU) Conversion of HFIR. In: Transactions of the 2014 COMSOL Conference in Boston, MA USA, October 2014.

39. D. Renfro et al. Continuing LEU Conversion Activities at the High Flux Isotope Reactor. In: U.S. High-Performance Research Reactors (USHPRR) Working Group Meeting, Richland, WA, USA, July 2014.

40. V.B. Khane, P.K. Jain. Steady State COMSOL Thermal-Hydraulics Models for ORNL's High Flux Isotope Reactor. In: 2013 ANS Winter Meeting and Nuclear Technology Expo, Washington DC, November 10-14, 2013.

41. J.D. Freels, P.K. Jain, C.J. Hurt. Investigation of Thermal Contact Gas Gap Conductance using COMSOL Version 4.3b. In: 2013 COMSOL Conference, Boston, MA, October 9-11, 2013.

42. D. Wang, P.K. Jain, J.D. Freels. Application of COMSOL Pipe Flow Module to Develop a High Flux Isotope Reactor (HFIR) System Loop Model. In: 2013 COMSOL Conference, Boston, MA, October 9-11, 2013.

43. A.S. Joshi, P.K. Jain, J.A. Mudrich, E.L. Popov. PRATHAM: Parallel Thermal Hydraulics Simulations using Advanced Mesoscopic Methods. In: 2012 ANS Winter Meeting and Nuclear Technology Expo, San Diego, CA, November 11-15, 2012.

44. J.N. Cantrell, E.J. Inclan, A.S. Joshi, E.L. Popov, P.K. Jain. CartGen++: Extending a CAD-Based Cartesian Mesh Generator for the Lattice Boltzmann Method. In: 2012 ANS Winter Meeting and Nuclear Technology Expo, San Diego, CA, November 11-15, 2012.

45. V.B. Khane, P.K. Jain, J.D. Freels. Development of CFD Models to Support LEU Conversion of ORNL's High Flux Isotope Reactor. In: 2012 ANS Winter Meeting and Nuclear Technology Expo, San Diego, CA, November 11-15, 2012.

46. V.B. Khane, P.K. Jain, J.D. Freels. COMSOL Simulations for Steady-State Thermal Hydraulics Analyses of ORNL's High Flux Isotope Reactor. In: COMSOL Conference, Newton, Mass, October 3-5, 2012.

47. J.D. Freels, P.K. Jain, R.W. Hobbs. Design and Nuclear Safety Related Simulations of Bare-Pellet Test Irradiations for the Production of Pu-238 in the High Flux Isotope Reactor using COMSOL. In: COMSOL Conference, Newton, Mass, October 3-5, 2012.

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Publications: Technical Reports

1. V. Yadav, V. Agarwal, A.V. Gribok, R.D. Hays, A.J. Pluth, C.S. Ritter, H. Zhang, P.K. Jain, P. Ramuhalli, D. Eskins, J. Carlson, R.L. Gascot, C. Ulmer, R. Iyengar. Technical Challenges and Gaps in Digital Twin

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Recent Invited Presentations

1. Prashant Jain, "Panel Discussion on Digital Twins for Risk and Safety Assessments," American Nuclear Society (ANS) meeting, Anaheim, CA, June 12-16, 2022.

2. Prashant Jain, "Panel Discussion on Machine Learning for Reactor Thermal Hydraulics: Progresses, Challenges, and Opportunities," American Nuclear Society (ANS) meeting, Anaheim, CA, June 12-16, 2022.

3. C. Sizemore, P.K. Jain et al., "High Flux Isotope Reactor Low-Enriched Uranium Conversion Activities – March 2022 Status Update," Presentation at the U.S. High-Performance Research Reactor (USHPRR) Silicide Meeting at ORNL, March 29, 2022.

4. N.S. Panicker, P.K. Jain et al., "Large Eddy Simulation study of Aluminum Smelting process using OpenFOAM," Presentation at the 7th Thermal and Fluids Engineering Conference (TFEC), Virtual/in-person Conference, May 16 - 18, 2022.