

Exponent®
Engineering & Scientific Consulting

Amir Jokar, Ph.D., P.E., CFEI, ASHRAE Fellow

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Professional Profile

Amir Jokar, Ph.D., P.E., CFEI, ASHRAE Fellow, is a principal engineer in Exponent's Thermal Sciences practice with more than 22 years of work experience in both industry and academia. His specialties include heating, ventilation, air conditioning, and refrigeration (HVAC&R); wildland and structure fire particulate (ash, char, soot) damage assessment; fire origin-and-cause investigation; low-GWP (global warming potential) flammable refrigerants testing; thermal-fluid systems failure analysis and forensic engineering; and computational thermal-fluid dynamics modeling.

Dr. Jokar provides consulting services for clients such as manufacturers, utilities, governments, insurance companies, and law firms. He has testifying experience as an expert witness in trials, arbitrations, mediations, appraisals, hearings, and class actions.

HVAC & Refrigeration Systems

Dr. Jokar helps clients diagnose and resolve failures across the full spectrum of HVAC&R systems. His consulting work spans residential and commercial air conditioning, data center cooling and ventilation, industrial refrigeration, supermarket and food-facility coolers and freezers, heat pumps, geothermal HVAC systems, ammonia refrigeration systems, and refrigerators and vending machines. He has evaluated compressor failures, heat exchanger performance, valve design, and household washers and dryers. He is an ASHRAE Fellow, and he has served on various technical committees, including past TAC Section 1 Head and chair of both TC 1.3 (Heat Transfer and Fluid Flow) and TC 8.5 (Liquid-to-Refrigerant Heat Exchangers).

Wildland & Structure Fire Damage Assessment

Dr. Jokar is among Exponent's leading experts in wildland and structure fire damage assessment, advising his clients on the distribution, deposition, and impact of fire particulate — including ash, char, and soot — on building materials, HVAC and mechanical systems, and interior contents. He has investigated smoke and thermal damage from both wildland fires and structure fires, assessing contamination of HVAC systems, ducting, insulation, interior finishes, and personal properties. His published research on wildfire particulate distribution in residential areas and its effects on building materials and attic insulation thermal performance provides a rigorous scientific foundation for damage quantification and remediation scoping. Dr. Jokar has served as an expert witness in wildfire/fire-related litigation and environmental proceedings.

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Fire Origin & Cause Investigation

As a Certified Fire and Explosion Investigator (CFEI), Dr. Jokar applies thermodynamic and combustion principles to determine the origin and cause of fires and explosions across residential, commercial, and industrial settings. His investigations have addressed HVAC and thermal system failures, battery fires in buildings, carbon monoxide poisoning, kitchen appliance fires, boiler and furnace failures, natural gas and solar power generation plant incidents, and industrial refrigerant releases. He has collaborated on multidisciplinary matters involving product liability, premises liability, and environmental litigation, bringing thermal science expertise to complex questions of ignition and fire/smoke-spread. Dr. Jokar has testified in California state court and other jurisdictions on fire and explosion matters.

Low-GWP Flammable Refrigerants

As a recognized authority on low-GWP flammable refrigerants, including A2L and A3 refrigerant classes, Dr. Jokar advises manufacturers, companies, and legal teams on refrigerant safety, system performance, and compliance with ASHRAE and NFPA standards. He has conducted extensive research and managed real-world projects on topics related to refrigerants, including carbon dioxide condensation in plate heat exchangers. He has been an active member of ASHRAE TC 3.1 (Refrigerants and Secondary Coolants) and has collaborated with other companies and agencies, such as the American Society of Automotive Engineers (SAE), to establish innovative methodologies for flammability testing of newly developed refrigerants.

Thermal-Fluid Sciences Consulting

Dr. Jokar provides thermal-fluid sciences consulting across a broad range of industries, integrating thermodynamics, fluid mechanics, and heat transfer analysis to support engineering evaluations, failure investigations, and litigation support. His work encompasses heat transfer analysis of geothermal cooling/heating systems thermal management of electronics and power cables, oil refinery design and contamination, hot water heater failures, household washer and dryer failures, thermal performance of building envelope systems, and mold/odor issues in automotive and residential cooling systems. He draws on both laboratory experimentation and advanced simulation to deliver rigorous, defensible conclusions for clients in manufacturing, energy, insurance, and legal sectors.

CFD Thermal-Fluid Modeling

Dr. Jokar applies computational fluid dynamics (CFD) and thermal-fluid simulation to solve complex engineering problems that cannot be resolved with testing alone. His CFD work includes modeling smoke and particulate transport in buildings following wildfire events and structure fire incidents, analyzing refrigerant flow and phase-change behavior in heat exchangers, simulating electronics cooling for high-power semiconductor applications, and evaluating fluid and thermal behavior in microchannel and compact heat exchanger geometries. He has used CFD to support both product development and litigation, providing visualizations and quantitative results that help clients and legal teams understand failure mechanisms, contamination pathways, and thermal hazards. Dr. Jokar's CFD expertise is grounded in peer-reviewed research and validated against experimental data, supporting scientifically defensible results.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, Kansas State University, 2004

M.S., Mechanical Engineering, Amirkabir University of Technology, Iran, 1998

B.S., Mechanical Engineering, Sharif University of Technology, Iran, 1995

Fellow, American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE), 2026

Distinguished Service Award (DSA), American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE), 2017

New Investigator Award, American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), 2009

Instructor Award, Mechanical Engineering, Kansas State University, 2004

Licenses and Certifications

Professional Engineer Mechanical, California, #35422

40-Hour Hazardous Waste Operation and Emergency Response Certification (HAZWOPER)

Certified Fire and Explosion Investigator (CFEI)

Professional Affiliations

American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Committee Member

• Technical Activities Committee (TAC) section 1 head, 2015-2019

• TC 1.3; Heat Transfer and Fluid Flow (chair 2013-2015, vice chair 2013-2015, vice chair 2011- 2013, program subcommittee chair 2008-2011, voting/corresponding member since 2011)

• TC 8.5; Liquid to Refrigerant Heat Exchangers (chair 2008-2010, program subcommittee chair 2005-2008, voting/corresponding member since 2011)

• TC 8.4; Air-to-Refrigerant Heat Transfer Equipment (corresponding member since 2011)

• TC 5.6; Control of Fire and Smoke (corresponding member since 2011)

• TC 1.13; Optimization (corresponding member since 2009)

• TC 3.1; Refrigerants and Secondary Coolants (corresponding member since 2014)

• SSPC 188 (Standard); Legionellosis: Risk Management for Building Water Systems (2020-2024)

• Local Chapter, Orange Empire, CA (2012-present)

American Society of Mechanical Engineers (ASME) Committee Member

• Associate Editor; Journal of Thermal Science and Engineering Applications (2015-2019)

• HTD K10; Heat Transfer Equipment (2007-present)

• HTD K16; Heat Transfer in Electronic Equipment (2008-2010)

• Local Chapter, Orange County, CA (2012-present)

National Fire Protection Association (NFPA)

• NFPA 87; Standard for Fluid Heaters (member since 2012)

American Society of Automotive Engineers (SAE), member since 2001

International Association of Wildland Fire (IAWF), member since 2016

Associate Editor: Heat Transfer Engineering, an International Journal (2020-present)

Languages

Persian

Publications

Jaimes D, Jokar A. New developments on investigating the ignition propensity of mildly-flammable refrigerants. Proceedings, ASHRAE Annual Conference, art no. IN-24-C032, Indianapolis, IN, 2024.

Shokrabadi M, Shusto L, Hunt J, Jokar A, Osteraas J. Investigation techniques and analysis of damage patterns in building structures due to wildfires. Proceedings, 10th Congress on Forensic Engineering, pp. 390-400, Seattle, WA, 2024.

Jokar A, Posson M, Malzahn D. Wildfire particulate deposition investigation and assessment in buildings. Proceedings, Fire and Climate Conference by International Association of Wildland Fire, Pasadena, CA, 2022.

Jokar A, O'Hern S, Anderson D, Cundy M, Ogle R. Flammable Refrigerants: performance comparison, safeties and lessons learned. Proceedings, ASHRAE Winter Conference, art no. AT-2019-C063, Atlanta, GA, 2019.

Jokar A, Wade RL, Posson M, Bennett P. Impact of wildfire particulate on common building materials. Proceedings, 2nd International Smoke Symposium, art. no. 3807, Long Beach, CA, 2016.

Jokar A, Christiansen EW, Reza A. Refrigeration systems failures due to sudden evaporation and condensation phenomena. Proceedings, ASHRAE Annual Conference, art. no. SE-14-C015, Seattle, WA, 2014.

Wade RL, Jokar A, Cydzik K, Dershowitz A, Bronstein R. Wildland fire ash and particulate distribution in adjacent residential areas. International Journal of Wildland Fire 2013; 22 (8):1078-1082.

Jokar A, O'Halloran SP. Heat transfer and fluid flow analysis of nanofluids in corrugated plate heat exchangers using computational fluid dynamics simulation. Journal of Thermal Science and Engineering Applications 2013; 5 (1), art. no. 011002.

Ayub Z, Khan MS, Jokar A, Khan TS, Hayes N. Recent developments in plate exchangers - Ammonia/Carbon Dioxide cascade condensers. Heat Transfer Engineering 2013; 34 (5-6): 401-408.

Jokar A, Christiansen EW. Condensation induced shock in thermal/fluid systems. ASME Heat Transfer/Fluids Engineering Summer Conference; HT2012, art. no. 58117, Puerto Rico, USA, 2012.

Jokar A, Wade RL, Tu WJ. Effects of wildfire ash on thermal performance of attic insulation batts. Proceedings, ASME Heat Transfer/Fluids Engineering Summer Conference; HT2012: art. no. 58118, Puerto Rico, USA, 2012.

Hayes N, Jokar A, Ayub Z. Study of carbon dioxide condensation in Chevron plate exchangers; Pressure drop analysis. International Journal of Heat and Mass Transfer 2012; 55:2916-2925.

Hayes N, Jokar A, Ayub Z. Study of carbon dioxide condensation in Chevron plate exchangers: Heat transfer analysis. International Journal of Heat and Mass Transfer 2011; 54:1121-1131.

O'Halloran S, Jokar A. CFD simulation of single-phase flow in plate heat exchangers. ASHRAE Transactions 2011; 117 (Part 1): 147-155.

Jokar A. Thermal/fluid systems design with an innovative teaching method. International Journal of Mechanical Engineering Education 2011; 39(4):275-290.

Dix J, Jokar A. Fluid and thermal analysis of a microchannel electronics cooler using computational fluid dynamics. Applied Thermal Engineering 2010; 30(8-9):948-961.

Jokar A, Eckels SJ, Hosni MH. Single phase flow in mesochannel compact heat exchangers for air conditioning applications. Heat Transfer Engineering 2010; 31(1):3-16.

Jokar A, Solovitz S. Thermo/fluids curriculum development in a new mechanical engineering program. Proceedings, ASME International Mechanical Engineering Congress; IMECE2010, art. no. 37001(6): 155-162, Vancouver, BC, Canada 2010.

Jokar A, Hayes N, Ayub Z. Recent developments in CO2 cascade condensers. Proceedings, Sustainable Refrigeration and Heat Pump Technology Conference (International Institute of Refrigeration), Stockholm, Sweden, 2010.

Solovitz S, Jokar A. Micro-particle image velocimetry visualization of water flow in a complex micro-heat exchanger. Journal of Flow Visualization and Image Processing 2009; 16(3):221-236.

Hayes N, Jokar A. Dynalene/water correlations to be used for condensation of CO2 in Brazed Plate Heat Exchangers. ASHRAE Transactions 2009; 115(2):599-616.

Cortez M, Jokar A. Development and testing of a prototype heat sink within a wind tunnel for use in an engineering course. Proceedings, ASME International Mechanical Engineering Congress; IMECE2009, art. no. 12084 (9-Part B): 983-989, Lake Buena Vista, FL, 2009.

Saffaraval F, Jokar A. Development of an R245fa electronics cooling system for high heat flux applications. Proceedings, ASME International Mechanical Engineering Congress; IMECE2009, art. no. 12076 (9-Part C): 1741-1747, Lake Buena Vista, FL, 2009.

Suffield S, Jokar A. Modeling the flow of a liquid droplet diffusing into various porous media for inkjet printing applications. Proceedings, ASME International Mechanical Engineering Congress; IMECE2008, art. no. 68151 (10-Part B): 1013-1022, Boston, MA, 2008.

Dix J, Jokar A, Martinsen R. Enhanced microchannel cooling for high-power semiconductor diode lasers. Proceedings, SPIE Photonics West Conference; LASE2008-6876: art. no. 687606, San Jose, CA, 2008.

Dix J, Jokar A, Martinsen R. A microchannel heat exchanger for electronics cooling applications. Proceedings, 6th International Conference on Nanochannels, Microchannels, and Minichannels; ICNMM2008 (Part B):1935-1936, Darmstadt, Germany, 2008.

Jokar A, Hosni MH, Eckels SJ. Mesochannel compact heat exchangers for automotive air conditioning applications. Proceedings, 6th International Conference on Nanochannels, Microchannels, and Minichannels; ICNMM2008 (Part B): 1937-1938, Darmstadt, Germany, 2008.

Jokar A. A hands-on approach to teaching thermal systems design. Proceedings, ASME International Mechanical Engineering Congress; IMECE2007, art. no. 41540 (7): 163-171, Seattle, WA, 2007.

Dix J, Jokar A, Martinsen R. Computational modeling for a microchannel electronics cooler. Proceedings, ASME International Mechanical Engineering Congress; IMECE2007, art. no. 42971 (5): 87-94, Seattle, WA, 2007.

Jokar A, Hosni MH, Eckels SJ. Dimensional analysis for the evaporation and condensation of refrigerant R134a in minichannel plate heat exchangers. Applied Thermal Engineering 2006; 26: 2287-2300.

Jokar A. Integration of computational fluid dynamics and experimentation in undergraduate fluid mechanics. Proceedings, ASME International Mechanical Engineering Congress; IMECE2006, art. no. 15256 (Mechanical Engineering Education), Chicago, IL, 2006.

Jokar A, Eckels SJ, Hosni MH. New generation integrated automotive thermal system. SAE Future Transportation Technology Conference; FTT, art. no. 01-3476, Chicago, IL, 2005.

Jokar A, Hosni MH, Eckels SJ. Correlations for heat transfer and pressure drop of glycol-water and air flows in minichannel heat exchangers. ASHRAE Transactions 2005; 111(2):213-224.

Jokar A, Hosni MH, Eckels SJ. Thermal-fluid characteristics of an automotive radiator used as the external heat exchanger in an auto air conditioning system. Proceedings, ASME Heat Transfer Summer Conference; HT2005, art. no. 72061 (4): 315-323, San Francisco, CA, 2005.

Jokar A, Hosni MH, Eckels SJ. A heat pump for automotive applications. 8th International Energy Agency Heat Pump Conference, Session: 7, Las Vegas, NV, 2005.(Published in IEA-HP newsletter 2005; 22).

Jokar A, Eckels SJ, Hosni MH, Gielda TP. Condensation heat transfer and pressure drop of the brazed plate heat exchangers using R134a. Journal of Enhanced Heat Transfer 2004; 11(2):161-182.

Jokar A, Eckels SJ, Hosni MH. Thermo-hydrodynamic of the evaporation of refrigerant R134a in brazed plate heat exchangers. Proceedings, ASME Heat Transfer/Fluids Engineering Summer Conference; HT-FED04, art. no. 56573(3):211-220, Charlotte, NC, 2004.

Jokar A, Eckels SJ, Hosni MH. Evaluation of heat transfer and pressure drop for the heater-core in an automotive heat pump system. Proceedings, ASME International Mechanical Engineering Congress; IMECE2004, art. no. 60824 (375-2):57-65, Anaheim, CA, 2004.

Project Experience

Dr. Jokar has worked on many multidisciplinary projects. A few examples are listed below:

- Investigated failure modes of HVAC systems and components, including compressors, condensers, evaporators, valves, and connecting pipes.
- Evaluated the flammability of newly developed low-GWP refrigerants with different ignition sources using a test chamber.
- Analyzed the design of cooling systems, relatability and risk assessment, partial and total cooling loss, and other system failures, including data centers.
- Evaluated the design of large geothermal HVAC systems in commercial buildings and hospitals.
- Performed fire origin-and-cause investigations of heat transfer equipment, including gas system flash fires and explosions, spaces heaters, and ovens.
- Conducted numerous projects pertaining to wildfire particulate (ash, char, soot) distribution, deposition, and contamination from small and large fires in and out of California.

- Performed smoke and thermal damage assessment on buildings, contents, fabric products, art items, etc. due to wildfires and structure fire incidents, ranging from small residential houses to large commercial buildings.
- Analyzed ventilation issues for small residential and large commercial and industrial buildings, cargo ships, and vehicles.
- Tested the air conditioning systems of passenger vehicles for condensation drainage and odor issues.
- Investigated cooling issues in large cold storage facilities with commercial and industrial scale freezers and coolers.
- Investigated cooling loads and heat transfer issues pertaining to refrigeration systems for food facilities and pharmaceutical systems and buildings.
- Conducted an experimental research study on the condensation of carbon dioxide in chevron-angle plate geometry exchangers.
- Conducted experimental research study on the evaporation and condensation of R134a refrigerant in plate heat exchangers.
- Performed computational analysis and experimental design for a microchannel electronics cooler for high-power semiconductor diode laser applications.
- Conducted an experimental research study on the analysis of a dual-loop automotive heat pump-air conditioning system.
- Analyzed the heat transfer and fluid flow of nanofluids in micro/mini-channel heat exchangers.
- Performed computational modeling and analysis of power cables buried underground and under rivers.
- Investigated pipe failures (burst, freeze, leakage) in buildings.

Peer Reviews

National Science Foundation Panelist, Thermal Transport Processes

Heat Transfer Engineering (Associate Editor; 2020-present)

Journal of Thermal Science and Engineering Applications (Associate Editor; 2015-2019)

Applied Thermal Engineering

Journal of Heat Transfer

Heat Transfer Research

Experimental Thermal and Fluid Science

Journal of Enhanced Heat Transfer

Journal of Electronic Packaging

International Journal of Refrigeration

Chemical Papers, International Journal

International Journal of Energy

Energy Conversion and Management

Special Topics & Reviews in Porous Media, An International Journal

Conferences: ASHRAE, ASME, ASEE, ITherm, InterPACK, HEFAT