Exponent®
Engineering & Scientific Consulting

Khaled Hashad, Ph.D., P.E., CFEI

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Professional Profile

Khaled Hashad's expertise is in computational fluid dynamics (CFD), heat transfer, aerosol science, air quality, atmospheric science, statistical analysis, and machine learning. He applies his expertise in areas including thermal management of consumer electronics, failure analysis, and root cause investigations of fires.

Prior to joining Exponent, Dr. Hashad was a PhD Candidate in the Mechanical and Aerospace Department at Cornell University. There he worked on optimizing urban green designs (vegetation) to mitigate traffic-related air pollution. He used computational fluid dynamics (CFD) to assess the pollutant reduction of novel urban green designs by analyzing the physical mechanisms by which the vegetation barriers reduce pollutants and provided guidelines for optimal barrier designs. He created machine learning models trained on CFD data to capture the effects of vegetation on pollutant behavior downwind of the barrier. Dr. Hashad also developed the first dispersion model that parameterizes the Gaussian plume equations to describe the impact of vegetation on near-road pollutant deposition and dispersion. Leveraging his expertise in aerosol science and CFD, Dr. Hashad also studied airborne virus transmission to help understand the spread of SARS-CoV-2 in indoor environments. He helped develop a validated CFD model that captures the intricate behavior of droplets and aerosols in indoor environments such as deposition, evaporation, and interaction with the air flow. Dr. Hashad also has experience evaluating the heat transfer of photovoltaic solar panels and how they affect the local microclimate and utilizing CFD to model the thermal management of batteries for electric vehicles using phase changing material.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, Cornell University, 2021

M.S., Mechanical Engineering, Cornell University, 2019

B.S., Mechanical Engineering, University of Connecticut, 2016

The Sibley School Excellence in Graduate Teaching Assistance Award, 2021

NSF Honorable Mention, 2018

Licenses and Certifications

Professional Engineer Mechanical, California, #M 42023

Certified Fire and Explosion Investigator (CFEI)

Professional Affiliations

American Society of Mechanical Engineers (ASME)

National Associations of Fire Investigators — NAFI

Languages

Arabic

French (France)

Publications

Hashad K, Yang B, Gallagher J, Baldauf R, Deshmukh P, Zhang KM. Impact of roadside conifers vegetation growth on air pollution mitigation. Landscape and Urban Planning 2023; 229: 104594

Hashad K, Yang B, Iskov V, Zhang KM. A Computationally Efficient Approach to Resolving Vehicle-Induced Turbulence for Near-Road Air Quality. J. Eng. Sustain. Bldgs. Cities. 3: 031001

Williams HJ, Hashad K, Wang H, Zhang KM. The potential for agrivoltaics to enhance solar farm cooling. Applied Energy 2023; 332: 120478

Hashad K, Gu J, Yang B, Rong M, Chen E, Ma X, Zhang KM. Designing roadside green infrastructure to mitigate traffic-related air pollution using machine learning. Science of the Total Environment 2020; 773: 144760.

Hashad K, Yang B, Baldauf RW, Deshmukh P, Isakov V, Zhang KM. Enhancing the local air quality benefits of roadside green infrastructure using low-cost, impermeable, solid structures (LISS). Science of the Total Environment 2020; 717: 137136.

Presentations

Williams H, Zhang K, Sun Y, Hashad K. Analysis of the Potential for Site Ventilation to Improve Overall Efficiency of Utility-Scale Solar Farms. International Conference on Applied Energy. 2021.

Yang B, Hashad K, Rodriguez A, Zhang KM. The Effect of Plexiglass Shields on Droplet/Aerosol Transmission of Virus in Indoor Environments. American Association for Aerosol Research 39th Annual Conference. Virtual meeting. 2021.

Zhang KM, Yang B, Hashad K, Rodriguez A. On the Intricate Relationship between Ventilation, Deposition and Airborne Virus Transmission in Indoor Environments. American Association for Aerosol Research 39th Annual Conference. Virtual meeting. 2021.

Yang B, Hashad K, Zhang KM. SARS-CoV-2 aerosol transmission modeling of the in-person lecture in a classroom. American Association for Aerosol Research 38th Annual Conference. Virtual meeting. 2020.Hashad K, Yang B, Zhang KM. Parameterizing pollutant dispersion and deposition for roadside vegetation. American Physical Society 73rd Annual Meeting of the Division of Fluid Dynamics. Virtual meeting. 2020.Yang B, Hashad K, Zhang KM. Mixing process parameterization of a building wake impact on a turbulent jet into a crossflow. American Physical Society 73rd Annual Meeting of the Division of Fluid Dynamics. Virtual meeting. 2020.

Hashad K, Liu X, Yang B, Zhang KM. A CFD study of a vegetative barrier as a near-road pollutant mitigation strategy: an evaluation of CFD modeling techniques with field measurement. American Association for Aerosol Research (AAAR) Conference, Portland, OR. 2019.

Hashad K, Yang B, Zhang KM. The Use of Vegetative Roadside Barriers to Mitigate Traffic Related Pollution: Influence of Particle Size and Wind Speed. 41st International Fine Particle Research Institute (IFPRI) Annual General Meeting, Burlington, VT. 2019.

Hashad K, Zhang KM, Prathiba P, Turner J, Fleischer D. The Effectiveness of Roadside Vegetation Barriers as a Near-Road Air Pollution Mitigation Strategy: A Comprehensive Evaluation of the Sensitivity to Leaf Area Density. International Aerosol Conference. Saint Louis, MO. 2018.

Zhang KM, Li A, Xu W, Zhang S, Yang B, Hashad K, Sward J, Gu J, Allen G, Schwab J, Felton D, Rattigan O. “Linking light absorption properties to combustion efficiency for individual residential wood smoke sources”, American Association for Aerosol Research Conference, Raleigh, NC, October 2017.

Hashad K, Yang B, Zhang KM. Optimizing Urban Green Designs to Mitigate Traffic- Related Air Pollution. American Association for Aerosol Research Annual Conference. Rayleigh, NC. 2017.

Hashad K, Yang B, Iskov V, Zhang KM. Comparing Different Vehicle Induced Turbulence (VIT) Formulations on Near-Road Dispersion of Particulate and Gaseous Pollutants. American Association for Aerosol Research Annual Conference. Rayleigh, NC. 2017.