# Ex/ponent®
Engineering & Scientific Consulting

## Kaeley Stevens, Ph.D.

Associate | Thermal Sciences
Atlanta
+1-678-412-4802 | kstevens@exponent.com

## Professional Profile

Dr. Stevens applies her expertise in heat transfer, thermal-hydraulics, and fluid mechanics to assist clients in solving challenging technical problems across a range of industries and applications. She holds a bachelor's degree in mechanical engineering as well as master's and doctorate degrees in nuclear engineering. Her graduate research utilized computational fluid dynamics to conduct thermal-hydraulic analysis for the optimization of thermal management in nuclear applications. During her studies, Dr. Stevens also designed and built a prototype solar electric immersion cooker for use in underdeveloped countries.

Prior to joining Exponent, Dr. Stevens received her Ph.D. in nuclear engineering from Oregon State University while collaborating with the Idaho National Laboratory (INL). She performed research on digital twin modeling (i.e., generation of a dynamic, "living" digital model of a physical asset) of a heat pipe-based test facility for a proof-of-concept study on a novel remote operation system framework. The objective of her research was to develop the digital twin model, demonstrate its use within the system, and prove its functionality across several use case scenarios. Dr. Stevens used INL's Multiphysics Object Oriented Simulation Environment (MOOSE) and a MOOSE-based application called Sockeye for physics-based finite element modeling of the heat pipe test facility for the digital twins. She also utilized a Python package called PySINDy to conduct data-based regression modeling of the facility.

Dr. Stevens earned her M.S. in nuclear engineering, also from Oregon State University, while working with NuScale Power. Her research utilized ANSYS-CFX software to perform computational fluid dynamics analysis of the natural circulation flow of a liquid metal-hydride within the primary vessel of a novel nuclear microreactor design. The objective of her research was to assess the natural circulation flow path throughout the reactor vessel and optimize it to meet certain target figures of merit for reactor operation. Dr. Stevens' collaboration with NuScale Power resulted in a currently pending patent on thermal power conversion systems involving heat pipes and photovoltaic cells.

## Academic Credentials & Professional Honors

Ph.D., Nuclear Engineering, Oregon State University, 2024

M.S., Nuclear Engineering, Oregon State University, 2021

B.S., Mechanical Engineering, California Polytechnic State University, SLO, 2019

Henry W. & Janice J. Schuette Fellowship, 2021-2022

## Prior Experience

Graduate Fellow, Idaho National Laboratory, 2022-2024

NuScale Power, Graduate Intern, 2020-2022

## Professional Affiliations

American Nuclear Society (ANS)

## Patents

U.S. Patent Application No. 17/404,607: Thermal Power Conversion Systems Including Heat Pipes and Photovoltaic Cells, filed August 17, 2021 (Botha D, Mirsky S, Stevens K).

## Publications

Stevens, K., Oncken, J., Boring, R., Ulrich, T., Culler, M., Bryan, H., Browning, J., Gutowska, I. (2024). Opportunities, Challenges, and Research Needs for Remote Microreactor Operations. Nuclear Technology, 1-17.

**Presentations**

Steady-State Computational Fluid Dynamics Analysis of a Quarter-Core Liquid Metal-Hydride Cooled Microreactor. Conference presentation, ANS Winter Meeting, Phoenix, AZ, 2022.

Stevens, K., Oncken, J., Boring, R., Ulrich, T., Culler, M., Bryan, H., Browning, J., Gutowska, I. Opportunities and Challenges for Remote Operations. Conference presentation, 13th Nuclear Plant Instrumentation, Control & Human-Machine Interface Technologies, Knoxville, TN, 2023.

Stevens, K., Oncken, J., Culler, M., Bukowski, S., Ulrich, T., Boring, R., Gutowska, I. Digital Twin Framework for the Resilient Remote Monitoring and Operation of Nuclear Microreactors. Conference presentation, AHFE 2023 Hawaii Edition, Honolulu, HI, 2023.

Stevens, K., Oncken, J., Gutowska, I. Modeling for a Digital Twin-Based Remote Operation System Framework. Conference presentation, ANS Annual Meeting, Las Vegas, NV, 2024.