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## Advanced Thermal Management for Aerospace Propulsion Systems

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**Abstract:** As the aerospace industry is striving to meet ever tightening environmental regulation standards and to aggressively reduce greenhouse gas emissions, new technology injections facilitate the evolution and/or revolution of aircraft propulsion systems. Several competing technical pathways have been identified as potential candidate in achieving low- or zero- carbon emissions, including more efficient gas turbines using Sustainable Aviation Fuel (SAF) or hydrogen, hybrid electric propulsion integrating battery packs and gas turbines, and pure electric propulsion systems with either battery or hydrogen fuel cell as energy sources. However, no matter which technical paths the industry takes, advanced thermal management has been identified as one of the limiting factors in deciding the ceilings of power/energy density and efficiency of next-generation propulsion systems. The recent advancements in additive manufacturing enable functional components featuring unique lattice structures at the core of aviation propulsion systems to be manufactured to achieve advanced thermal management.

**Biographical Sketch:** Dr. Zekai Hong received his Ph.D. in Mechanical Engineering from Stanford University in 2010 with a focus on combustion. Upon graduation, he joined GE Global Research Centre at Niskayuna, New York as a combustion research engineer working on GE's new product line of ultra-efficient, low-emission turbofan engines, including GE9X, LeapX, and GENx engines. In 2017, Dr. Hong was appointed as a Senior Research Officer at National Research Council Canada's Aerospace Research Centre in Ottawa, Canada. Currently he also serves as an Adjunct Professor of Mechanical Engineering at the University of Ottawa. Dr. Hong has authored 45 peer-reviewed journal papers, some of which are among the most cited articles. Dr. Hong was awarded an Early Career Award from Global Power & Propulsion Society (GPPS) in 2019 and was elected to an Associate Fellow of American Institute of Aeronautics and Astronautics (AIAA) in 2021.

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