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Supersonic Combustion Heat Flux in Rotating Detonation Engine¹ FOLUSO LADEINDE, Stony Brook University, SOMNIC JACOBS, State University of New York, South Korea — Rotating detonation engines (RDEs) have been investigated extensively in recent years as a candidate for a high thermodynamic efficiency air-breathing propulsion system. The propulsive performance of the engine has been studied a great deal, as have the effects of numerous parameters of the system, such as the dynamics of the detonation wave, the cellular structure, turbulence, injection flow rate, injector design, and numerous other factors. However, to the knowledge of the authors, the issue of heat transfer in the RDE system has not received enough attention, even though such a study would be quite valuable in determining the cooling requirements of the engine and the effects of system parameters on thermal management. This is particularly important because of the high temperatures involved in the RDE engine. The present study has been undertaken to address this knowledge gap using the large-eddy simulation approach to analyze the combustion in the system and determine the heat flux distributions that result. To the knowledge of the authors, no previous studies have addressed this issue to any significant extent.

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