Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Experimental Investigation of Flame Stability in Porous Media Burners[1] DANYAL MOHADDES, SADAF SOBHANI, EMERIC BOIGNE, PRIYANKA MUHUNTHAN, MATTHIAS IHME, Stanford University — Porous media burners (PMBs) facilitate the stabilization of a flame inside the pores of a solid porous material, and have benefits when compared to traditional burners in terms of emissions reduction and operating envelope extension. PMBs can potentially find application in a wide variety of domains, including household and industrial heating, internal combustion engines, and gas turbine engine combustors. The current study aims to motivate the use of PMBs in such applications on a thermodynamic basis, and subsequently compares the performance of two PMB designs. To this end, an experiment was devised and conducted to determine the stable operating conditions of a continuously varying and a discontinuously varying pore diameter profile PMB. In addition to investigating the stability regime of each design, pressure drop and axial temperatures were measured and compared at different operating conditions. The collected experimental data will be used both to inform computational studies of combustion within porous media and to aid in future optimizations of the design of PMBs.

[1]This work is supported by a Leading Edge Aeronautics Research for NASA (LEARN) grant (Award no. NNX15AE42A).

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Date submitted: 31 Jul 2017 Electronic form version 1.4