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Optimum Cavity Radius Within a Bottle-Shaped Thermoacoustic Engine[1] JUSTIN BRIDGE, BONNIE ANDERSEN, Utah Valley University — Heat energy can be used to generate acoustic energy due to thermoacoustic interactions. These engines can be used to create sound waves without any moving parts, like pistons, and could be used in space to convert solar energy into electricity. This research focused on the optimization of the geometry of bottle-shaped resonators used for thermoacoustic prime movers. These resonators have the advantage of non-harmonic overtones compared with half-wave resonators. The resonators for this research were constructed of concentric cylinders consisting of a neck piece and a cavity. The dimensions were approximately 5 cm with an ID of 2 cm for the neck and 10 cm long with IDs varying from about 2 cm to 12 cm for the cavity, producing operating frequencies ranging from approximately 1.2 to 1.5 kHz, following a theoretical model. Twelve different cavity radii were tested. The optimal cavity radius of 2.06 cm had an onset time that was 27 s faster and an onset temperature difference that was lower by 12 $^{\circ}$ C than the smallest cavity (a half-wave resonator). Future research will explore the quality factor and optimum stack to surface area ratio of the engines.

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