

Abstract Submitted
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Comparing woven wire screens as thermoacoustic prime mover heat exchangers¹ MICHAEL JORGENSEN, Utah Valley University Department of Physics — Many factors influence the performance of standing wave thermoacoustic prime movers. Simplifying the design of heat exchangers (HEXs) for use with high frequency prime movers is important, given that traditional tube and fin HEXs on engines operating near 2.7 kHz would be quite costly and complicated to fabricate because the resonators are significantly smaller. Therefore, readily available woven copper meshes were compared for use as hot and cold HEXs, with the following mesh sizes: 24x24, 40x40, 60x60, and 80x80 wires/in. Each was used as a cold HEX and a hot HEX with all combinations tested at five different temperature gradients. The combinations with more free space in the cold HEX relative to the hot HEX displayed superior acoustical performance in nearly all cases with the four highest temperature gradients. In particular, the 80x80 hot HEX paired with the 24x24 cold HEX demonstrated extraordinary performance. Thus, this study suggests the performance of the prime mover can be enhanced by increasing the free space in one HEX relative to the other and that whether the hot HEX should have more or less free space depends on the temperature gradient applied.

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