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Raising Power Output in an Acoustic Energy Harvester MICHAEL PRIMROSE, OREST SYMKO, University of Utah — A promising approach for the conversion of heat to electricity consists of coupling a thermoacoustic heat engine to a piezoelectric device. When heated, this unit resonates at high audible frequencies which are converted to electricity. Being compact and small its power output is limited. To overcome this, several piezoelectric devices can be coupled to the acoustic engine thereby generating more electrical power at the expense of increasing the load on the engine. In the prototype studied, three PZT unimorph piezoelectric devices converted the heat-generated sound at 2.5 kHz in the engine to electrical signals which were rectified and sent to a resistive load matched to the unimorphs. Within variations in device characteristics, results show a three-fold increase in power to the load, effectively raising the power density of the converter. Such approach with multiple piezoelectric elements provides increased power output within impedance limitations of the engine. The technique, based on a device that has essentially no moving parts and is simple, shows much promise for the conversion of heat to electricity in many applications.

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