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Abstract

A thermoacoustic generator is an energy conversion device. It converts thermal energy into acoustic energy by using the stack. That is porous medium that contains a large number of channels. The acoustic energy can be converted into electric energy by the alternator. The condenser mics, speakers and piezoelectric materials can use as alternators. The atmospheric air is used as a working fluid. Generally, Helium, Neon, Argon and their proper mixtures are preferred as the working fluid. That has a high sound speed and high mean pressure. That types of working fluids yield high acoustic power density. prime mover. Thermoacoustic generator is an environmental friendly. Its biggest advantage is that they do not use harmful gas as a working fluid. It uses helium which is noncombustible, nonpoisonous inert gas having zero global warming effect. The generator length is quarter wave length that is equal to the length of a resonator tube. The alternator and the stack are fixed inside the resonator tube. The solar thermal energy, waste heat from internal engine and heat from industrial waste are used as a hot heat exchanger (heat source). The cold heat exchanger (sink) is water or atmospheric air. The thermoacoustic generator has two heat exchangers they produce temperature difference across the stack. Now acoustic pressure wave creates and it propagates through a resonator tube. The pressure wave can work on the alternator. That does not contain any moving parts (no lubricant) and decrease the maintenance cost. The only disadvantage of this thermoacoustic engine is low efficiency. Lots of researches are developing on the stack and resonator design. It is based on linear thermoacoustic theory combined with numerical simulations in the thermoacoustic design soft wares. The 612 mm long thermo-acoustic generator was design, built and tested. That device generates sound at 84.2°C -275.7°C temperature difference across the stack. Approximately, device produced acoustic power and internal efficiencies of the acoustic generator are 0.90-19.20 W and 0.05-0.06 % respectively.

Key wards:

Thermoacoustic generator, Cold heat exchanger, Linear thermoacoustic, Design

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