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Design of the cost-effective traveling-wave thermoacoustic electric generator

A cost-effective traveling-wave thermoacoustic electric generator, which is composed of two stage traveling wave thermoacoustic engines and two loudspeakers as alternators, is promising in solar power generation and energy recovery due to its cost-effective and capability of utilizing low-grade heat. In this paper the design of the cost-effective traveling-wave thermoacoustic electric generator, using the linear thermoacoustic theory, is described. Due to the large number of parameters, a choice of some parameters along with dimensionless independent variables will be introduced. The design strategy described in this paper is a guide for the design and development of thermoacoustic electric generator. The optimization of the different parts of the generator will be discussed, and criteria will be given to obtain an optimal system. The alternators are 8 inch commercial loudspeaker (B&C 8NW51). After optimization, the model shows the designed prototype can deliver 517W of electricity at a thermal-to-electrical efficiency of 10%.

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