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Investigation performance of heat exchanger on thermoacoustic heat engine for harvesting a waste heat

Abstract

A green technology of acoustic of fluid-structure interactions become an emerging technology today, a call thermoacoustic heat engine. Thermoacoutics heat engine systems convert the energy on a harvesting from a waste heat energy and convert to an electrical energy. That component of devices a call a hot heat exchangers. This paper study was focused on a new design of thermoacoustics heat exchanger and investigation of its performance in terms of thermal analysis. A conceptual design was produced with three designs of hot heat exchangers, which are wire-type, finger-type and star-type. Commercial code ANSYS-CFX software are used on the evaluation, the heat exchanger's designs were simulated with two thermal conditions which are steady state and transient heat conduction. Materialselection from copper and aluminium a chosen to look-out the engagement between theoretical and numerical study. There are three inlet temperatures that are assumed will be supplied by constant waste heat which are 200°C, 350°C and 500°C.The star-type design has the highest value of heat conduction through a fin heat conduction with copper as a material which is 32.84W. Star-type hot heat exchanger recorded the fastest time to distribute temperature compared to wiretype and fingertype heat exchanger. Result shown the combination between star-type design and copper material will produce a good agreement to design a hot heat exchanger.

Keywords; Heat Conduction, Hot Heat Exchanger, Thermoacoustic