

**LOW GRADE THERMAL ENERGY HARVESTING
FROM
THERMO-ACOUSTIC GENERATOR**

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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

TABLE OF CONTENTS	PAGE
Declaration.....	i
Acknowledgement.....	ii
Abstract.....	iii
Table of Content.....	iv
List of Figures.....	vii
List of Tables.....	ix
List of Abbreviations.....	xi
List of Appendices.....	xv
CHAPTER 1.....	01
1.0 INTRODUCTION.....	01
1.1 Introduction	01
1.2 Background to thermo-acoustic.....	02
1.3 Introduction to thesis.....	04
1.4 Problem statement.....	05
1.5 Overview of thermoacoustic heat engine technology.....	05
1.6 Aim and objectives.....	05
1.7 Methodology.....	06
CHAPTER 2.....	07
2.0 LITERATURE REVIEW	07
2.1 Introduction.....	07
2.2 Principal characteristics of thermos-acoustic generator.....	07
2.3 Thermo-acoustic effect.....	07
2.4 Basic Mechanism of thermos-acoustic effect	09

2.5	Components of Resonator.....	19
2.6	Influence parameters.....	24
2.6.1	Plate spacing and thickness.....	25
2.6.2	Stack geometry.....	26
2.6.3	Critical temperature gradient.....	26
2.6.4	Working fluid.....	27
2.6.5	Mean pressure.....	28
2.6.6	Drive ratio.....	28
2.6.7	Frequency.....	29
2.7	The linear theory of thermo-acoustic.....	29
2.7.1	Analysis of a single plate.....	29
2.7.2	Analysis of a stack of parallel plate.....	33
2.7.3	The boundary layer approximation.....	35
2.7.4	Arbitrary stack geometry.....	36
2.7.5	Stack materials.....	38
2.8	Converting sound energy to electrical energy.....	38
2.8.1	Nature of sound and effect.....	39
2.8.2	Conversion mechanism.....	39
2.9	Thermo-acoustic modelling technique	44
CHAPTER 3.....		48
3.0	SEPERIMENTAL SETUP.....	48
3.1	Design and fabrication specification.....	48
3.2	Method.....	53
3.3	Data recording.....	54
CHAPTER 4.....		55
4.	ANALYSIS OF THE EXPERIMENTAL RESULTS.....	55

4.1	Sample calculation of temperature gradient & mean temperature.....	56
4.2	Sample calculation of sound velocity and frequency.....	57
4.2.1	Sample calculation of pressure at stack inlet.....	58
4.2.2	Sample calculation of thermal penetration depth for air	58
4.2.3	Sample calculation of power.....	58
4.3	Sample calculation of input power.....	60
4.3.1	Sample calculation of cooling load.....	60
4.3.2	Sample calculation of practical acoustic power.....	60
4.3.3	Sample calculation of power dissipated through a load.....	60
4.3.4	Sample calculation of practical efficiency of TEA.....	61
4.3.5	Sample calculation of carnot's cycle efficiency	61
4.3.6	Sample calculation of theoretical efficiency of TAE.....	61
4.3.7	Sample calculation of energy conversion efficiency.....	61
CHAPTER 5.....		63
5.0	RESULTS & DISCUSSION.....	63
5.1	Measured parameters.....	66
5.2	Some thermo-acoustic wave features tested by test rig	68
CHAPTER 6.....		74
6.0	CONCLUSIONS.....	74
6.1	Future works.....	75
REFERENCES.....		76
APPENDICES		82

LIST OF FIGURES		PAGE
Figure 1	Basic thermo-acoustic mechanism	9
Figure 2	(a) Singing pipe, (b) practical regenerator in a travelling-wave thermoacoustic engine	10
Figure 3	Processes within a standing wave thermoacoustic engine	10
Figure 4	Mechanism of heat transfer by the gas parcels along the stack plate	11
Figure 5	Distribution of acoustic pressure amplitude (A) and velocity amplitude (B) along the resonator axis	13
Figure 6	The sound velocity variation with frequency for constant wave length	14
Figure 7	The sound velocity variation with frequency for constant wave length	15
Figure 8	Thermoacoustic engine experimented with by Wheatley et al	23
Figure 9	The available stacks geometry	26
Figure 10	A solid plate kept in an acoustic field. The length of plate is Δx along x , $\Pi/2$ along z	30
Figure 11	A stack of parallel plates. Each plate has a thickness $2l$ and spacing between plates is $2y_0$	33
Figure 12	12Various pore geometries studied by Arnott et.al	37
Figure 13	The hexagonal unit cell of a pin array stack	37
Figure 14	Real and imaginary parts of Rott's functions for parallel plates, circular pores and pin array stack	38
Figure 15	The direct piezoelectric effect	41
Figure 16	Piezoelectric types of effect	41
Figure 17	Energy conversion mechanism	42

Figure 18	The sound energy converts to electric energy via diaphragm supported moving coil with a magnet	43
Figure 19	Idealized thermo-acoustic cycle for an elemental gas parcel oscillating between a section of the plates of a regenerator with an applied temperature gradient - this process is repeated along the entire length of the plates, amplifying the acoustic wave	45
Figure 20	Heat transfer between the plates in a thermoacoustic engine (TAE)	45
Figure 21	Computational domain and implemented boundary conditions for considered variables L , H , Z , N , d_c	45
Figure 22	The schematic drawing (a) and schematic diagram (b) of fabricated thermo-acoustic generator	48
Figure 23	The Test rig photo (experimental apparatus)	49
Figure 24	The Copper cooling coil	50
Figure 25	The stack and Hot heat exchanger	51
Figure 26	The cooling bath and their components	52
Figure 27	The alternator back face (a) and front face (b)	52
Figure 28	SPL variation at resonator outlet	68
Figure 29	Thermal penetration depth variation with temperature difference across the stack.	69
Figure 30	The relationship between voltage Output and temperature difference along the stack	70
Figure 31	Axial flow velocity variation	70
Figure 32	Temperature variation long resonator axis	71
Figure 33	Measured thermal efficiency of the engine as a function of the input power.	72
Figure 34	Acoustic power produced by the stack	73