CFD ANALYSIS OPF THERMODYNAMIC BEHAVIOUR OF THERMAL-LAG ENGINE COMPARED WITH STIRLING ENGINES

By

Eng. Muhamad Salaheldin Muhamad Mustafa Eldebawy

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
in
Mechanical Power Engineering

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Title of Thesis:

CFD Analysis of thermodynamic behaviour of Thermal-lag engine compared with Stirling engines

Key Words:
Stirling engines; Thermal-lag engines; air engines; CFD analysis

Summary:
The extensive usage of conventional energy resources and the lack of universal access to modern sources of energy is one of major constraints to Environmental deterioration. Using Stirling technology is one of the radical solutions for these issues. In this thesis, the thermal-lag engine (TLE) is analyzed to have a comprehensive perception for this engine and its own cycle by creating a three-dimensional (3D) model and solve the equations of continuity, energy and momentum as well as turbulence equations by using CFD technology. Moreover, pressure and temperature distributions are illustrated and many other effects like dwell time, thermal lag and gas swirling effects are captured and discussed. Finally, a proposed TLE and a modified ideal cycle have been suggested for better engine performance and more power output.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Date:

Signature:

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All praise belongs to Allah Almighty for his uncountable grace, blessings and generousness throughout all my life.

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