



**UNIVERSITI PUTRA MALAYSIA**

***SIZING AND ANALYSIS OF PULSEJET ENGINE FOR UNMANNED  
AERIAL VEHICLE***

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**SIZING AND ANALYSIS OF PULSEJET ENGINE FOR UNMANNED  
AERIAL VEHICLE**

By

**SEVDA AHMADIAN**

**This is Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in  
Fulfillment of the Requirement for the Master of Science**

**July 2012**

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## **DEDICATION**

I praise to Allah the Almighty, given me the knowledge, effort and strength to complete this Master Degree. my respected father and mother ,Mr Farhad Ahmadian and Madam Ashraf Soltankhah.



Abstract of thesis presented to the Senate of University Putra Malaysia in fulfillment of the requirement for the degree of Master of Science

**SIZING AND ANALYSIS OF PULSEJET ENGINE FOR UNMANNED AERIAL  
VEHICLE**

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**SEVDA AHMADIAN**

**July 2012**

**Chairman : Colonel Mohamed Tarmizi Ahmad**

**Faculty : Engineering**

The pulsejet has recently received more research interests due to its simple design, which can be developed into low-cost micro-scale propulsion devices for use in many of today as new applications such as UAVs and Unmanned Combat Vehicles (UCAV).

The major obstacle for development of pulsejet engine is low efficiency of engine. The objective of this research is to investigate the possibility of using pulsejets in certain applications where the pulsejet can trade its low efficiency with low cost, simple design, and light weight.

Numerical analysis is used for analysing the pulsejet engine design, This research provides many proven equations and graphs for theoretical understanding of pulsejet engine design for improving of engine performance, for this purpose the geometry of inlet, combustion chamber and tailpipe on the performance of valved pulsejet engine were studied, the effect of the environment, such as free stream speed, ambient pressure and temperature, on the performance of pulsejet engine also were explained.

The main results drawn from this research is increasing efficiency and improving performance of engine by improving size of engine specially diameter of combustion chamber, To reach this result computed data(data from new design) with published data(data from previous researches) were compared.

**Abstrak Tesis Yang Dikemukakan Kepada Senat Universiti Putra Malaysia Sebagai Memenuhi Keperluan Untuk Ijazah Master Sains**

**SAIZ DAN ANALISIS ENJIN PULSEJET UNTUK KENDERAAN UDARA  
TANPA PEMANDU**

Oleh

**SEVDA AHMADIAN**

**July 2012**

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**Fakulti : Kejuruteraan**

Pulsejet baru-baru ini telah diberi lebih kepentingan dalam penyelidikan kerana reka bentuk yang mudah yang boleh dibangunkan menjadi alat pendorongan berskala mikro pada kos yang rendah untuk digunakan terkini sebagai applikasi baru seperti kenderaan udara tanpa pemandu (UAV) dan kenderaan pertempuran tanpa pemandu (UCAV).

Halangan utama untuk pembangunan enjin pulsejet adalah kecekapan enjin yang rendah. Objektif kajian ini adalah untuk menyiasat kemungkinan menggunakan pulsejets dalam aplikasi tertentu di mana pulsejet yang boleh bersaing dengan kecekapan dan kos yang rendah, reka bentuk mudah, dan ringan.

Analisis berangka digunakan untuk menganalisis reka bentuk enjin pulsejet. Penyelidikan ini memberi banyak persamaan terbukti dan graf untuk pemahaman teori reka bentuk enjin pulsejet untuk meningkatkan prestasi enjin, untuk tujuan ini geometri masuk, kebuk pembakaran dan tailpipe kepada prestasi enjin pulsejet berinjap telah dikaji, kesan alam sekitar, seperti kelajuan arus bebas, tekanan ambien dan suhu, kepada prestasi enjin pulsejet juga dijelaskan.

Keputusan utama diambil daripada penyelidikan ini semakin meningkat kecekapan dan meningkatkan prestasi enjin dengan meningkatkan saiz enjin khas diameter kebuk pembakaran, Untuk mencapai keputusan ini data yang dikira (data dari reka bentuk baru) dibanding dengan data yang telah diterbitkan (data dari kajian sebelumnya).

## **ACKNOWLEDGEMENTS**

In the name of ALLAH S.W.T., The most Beneficial and The most Benevolent .Glory to ALLAH S.W.T. and asking blessing on salute noble Prophet Muhammad S.W.A., his companion's and who those follow him upholding the cause of right path. I am thankful to ALLAH S.W.T by his infinite Mercy and Grace, made my humble endeavors possible and this blessing upon thought of the completing of these thesis.

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Finally and most importantly are my family, particularly my parents and my husband, who had withstood my late hours, spoiled weekend and bad temper.

I certify that a Thesis Examination Committee has met on 10 July 2012 to conduct the final examination of Sevda Ahmadian on her thesis entitled "Sizing and Analysis of Pulsejet Engine for Unmanned Aerial Vehicle" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

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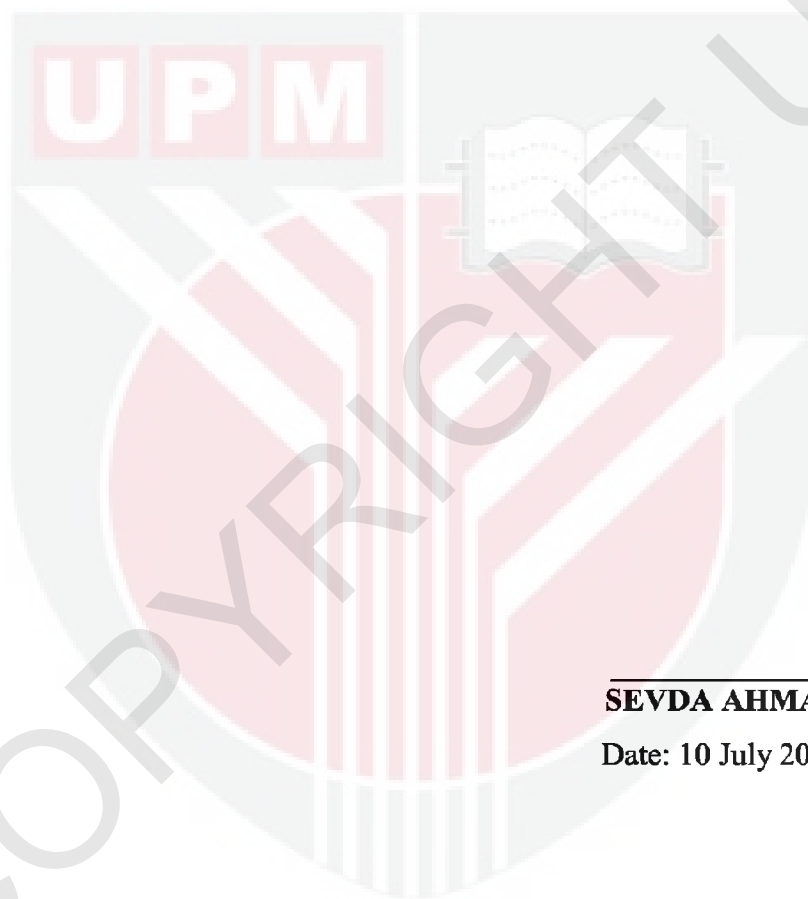
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## DECLARATION

I declare that the thesis is based on my original work except for quotations and citations which have been dully acknowledged. I also declare that it has not been previously or is not concurrently, submitted for any other degree at Universiti Putra Malaysia or other institutions.



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**SEVDA AHMADIAN**

Date: 10 July 2012

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