شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

MONA MAGHRABY

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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MONA MAGHRABY

OPTIMUM CONFIGURATION OF WING-TAIL TANDEM ARRANGEMENT AT LOW REYNOLDS NUMBER

By

Muhammad Shaaban Eissa Ahmad Abul-Ela

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
Aerospace Engineering

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT
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Professor of Aerodynamics
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Title of Thesis:

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Key Words:

Tandem arrangement; Low-Reynolds number airfoil; Laminar separation bubbles, Stagger effect; Incompressible viscous flow.

Summary:

The optimum configuration of 2D wing and tail of a certain T-tail UAV placed in tandem arrangement and operate at low Reynolds number is discussed numerically. Total lift-to-drag ratio is studied at different tail configurations relative to the wing in order to get the maximum total lift-to-drag ratio which is corresponding to maximum range of UAV. The numerical simulation is performed using ANSYS FLUENT 18.0 software package while the mesh is generated by PointWise 18.1 software package. Examination of PointWise 18.1 software in dealing with meshing at different cases of flow and airfoils is performed. SST k-ω turbulence model is the suitable model for low Reynolds number tandem wings. The outcomes are validated against the available experimental data.

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: Muhammad Shaaban Eissa Abul-Ela Date:

Signature:

Dedication

Dedicated to my loyal wife Dr. Omnia Rabie and my kids Oumair and Aisha

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Muhammad Shaaban

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