Cairo University

NUMERICAL SIMULATION OF IGNITION FLAME PROPAGATION OF GASEOUS HYDROGEN-AIR PROPELLANTS

By

Omar Magdy Gamal ElDin ElBoughdady

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

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Under the Supervision of

Prof. Aly AbdelFatah Hashem

Professor
Aerospace Engineering Department
Faculty of Engineering, Cairo University

Prof. Farouk Mohamed Owis

Professor
Aerospace Engineering Department
Faculty of Engineering, Cairo University

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Approved by the Examining Committee

Prof. Aly AbdelFatah Hashem,	Thesis Main Advisor
Prof. Farouk Mohamed Owis,	Advisor
Prof. Ibrahim Mohamed Shabaka,	Internal Examiner
Prof. Ahmed Farouk Abdel Gawad, Mechanical Power Department, Faculty of Engineering, Zagazig University	External Examiner,

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT
2018

Engineer's Name: Omar Magdy Gamal
Date of Birth 26 / 11 / 1990
Nationality: Egyptian
E-mail: omarelboughdady@gmail.com
Phone: 01274544956
Address: 9 Dr. Hamuda st, Mashaal, AlHaram

Registration Date: 1 / 1 / 2015
Awarding Date: / / 2018
Degree: Master of Science
Department: Aerospace Engineering
Supervisors:

Prof. Aly AbdelFatah Hashem
Prof. Farouk Mohamed Owis

Examiners:

Prof. Ahmed Farouk Abdel Gawad,	External Examiner
Prof. Ibrahim Mohamed Shabaka,	Internal Examiner
Prof. Aly AbdelFatah Hashem,	Thesis Main Advisor
Prof. Farouk Mohamed Owis,	Advisor

Title of Thesis:

Numerical Simulation of Ignition Flame Propagation of Gaseous Hydrogen-Air Propellants

Key Words:

Ignition, Quenching, Flame Propagation, Chemical Kinetics, Combustion.

Summary:

Ignition is a fundamental process for combustors. Its success or failure depends on flow properties and mixture concentration. The existence of regime where the flow velocity is less than that of the flame has a decisive impact on flame stability. If the bulk of flow has high velocity, flame might be quenched or be swept by the flow. Quenching occurs when the heat released was less than the heat lost to the mixture. Eddies created by the injection pattern create vortices that aided the mixing of the fuel and oxidizer helped anchor the flame.

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