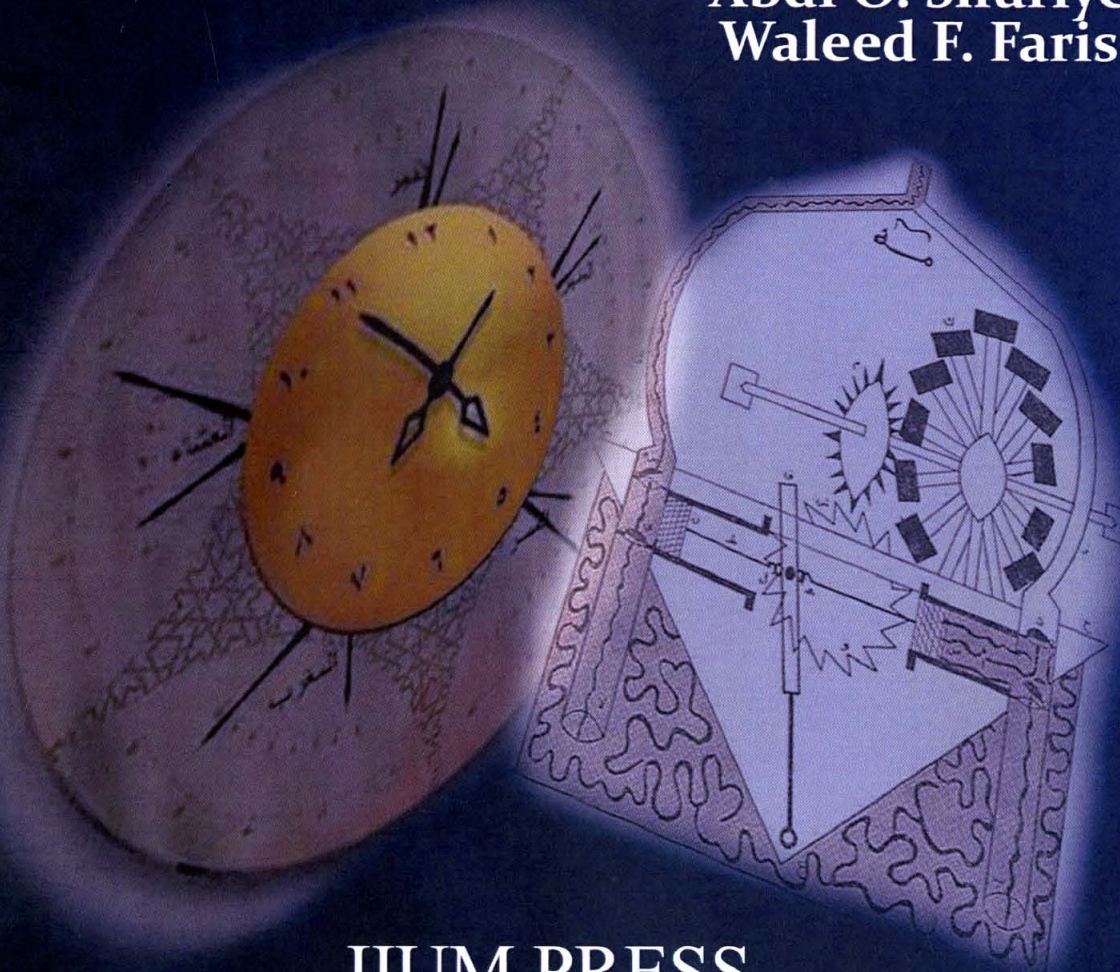


# Contributions of Early Muslim Scientists to Engineering Studies and Related Sciences

Abdi O. Shuriye  
Waleed F. Faris



IIUM PRESS  
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA



# **Contributions of Early Muslim Scientists to Engineering Sciences and Related Studies**

---

## **Editors**

Abdi O. Shuriye  
Waleed F. Faris



**IIUM Press**

Published by:  
IIUM Press  
International Islamic University Malaysia

First Edition, 2011  
©IIUM Press, IIUM

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without any prior written permission of the publisher.

Perpustakaan Negara Malaysia

Cataloguing-in-Publication Data

Abdi O. Shuriye & Waleed F. Faris : Contributions of Early Muslim Scientists to Engineering Sciences and Related Studies

ISBN: 978-967-418-157-4

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM  
(Malaysian Scholarly Publishing Council)

Printed by :  
**IIUM PRINTING SDN.BHD.**  
No. 1, Jalan Industri Batu Caves 1/3  
Taman Perindustrian Batu Caves  
Batu Caves Centre Point  
68100 Batu Caves  
Selangor Darul Ehsan  
Tel: +603-6188 1542 / 44 / 45 Fax: +603-6188 1543  
EMAIL: iiumprinting@yahoo.com

---

## Contents

| <u>TITLE</u>  |     |
|---|-----|
| Preface   | v   |
| Acknowledgment  | vi  |
| Lists of Contributors   | vii |
| Introduction  | 1   |
| Chapter 1 Al-Battani's Contribution to Astronomy  | 3   |
| Chapter 2 Safiha by Al-Zarqali  | 8   |
| Chapter 3 Ibn Al Shatir's Influence on Modern Astronomy   | 12  |
| Chapter 4 l-Zarqali on Instrumentation  | 19  |
| Chapter 5 Contributions of Al-Razi on Alchemy in Terms of Metal<br>and Substance                            | 24  |
| Chapter 6 Jabir Ibn Hayyan's Work on Sulphur-Mercury Theory   | 30  |
| Chapter 7 The Contribution of Hassan Al-Rammah to Gunpowder<br>and Rocket Technology                        | 36  |
| Chapter 8 The Contribution of Ibn Al-Awwam in Botany<br>and Agriculture                                     | 41  |
| Chapter 9 Al-Battani Contributions in Astronomy and Mathematics   | 45  |
| Chapter 10 Al-Biruni's Views on the Discovery of the Spherical Earth  | 49  |
| Chapter 11 Al-Kashi and Access to the Arithmetic & Astronomy  | 53  |
| Chapter 12 Nasir Al-Din Al-Tusi's Understanding of Trigonometry   | 58  |
| Chapter 13 Al-Biruni's Experimental Scientific Methods in Mechanics   | 65  |
| Chapter 14 Al-Haytham's Understanding of Physical Nature of Light   | 70  |
| Chapter 15 Contributions of Ibn Al-Haytham on Optics  | 74  |
| Chapter 16 Energy Particle-Physics: The Efforts of Abdel Nasser Tawfik                                      | 80  |
| Chapter 17 Mahmoud Hessaby's Contribution to the Infinitely Extended<br>Particles Theory in Quantum Physics | 86  |
| Chapter 18 The Contribution of Ibn Ishaq Al-Kindi to Light, Optics and<br>Cryptology                        | 91  |
| Chapter 19 The Contribution of Ibn Sahl in Refraction of Light  | 95  |
| Chapter 20 Al Kindi on Pharmacology   | 103 |
| Chapter 21 Contributions of Kerim Kerimov in Aerospace Engineering  | 110 |
| Chapter 22 Fazlur Rahman Khan's Understanding of Tube Structural<br>System of Skyscrapers                   | 115 |

---

|            |  |     |
|------------|--|-----|
| Chapter 23 | Contribution of Lofti Asker Zadeh to Fuzzy Logic   | 121 |
| Chapter 24 | The Nano World of Munir Nahfey   | 127 |
| Chapter 25 | Abbas Ibn Firnas's Contribution in Aviation  | 135 |
| Chapter 26 | Al- Jazari Contribution to the Development of Water Supply System                                    | 139 |
| Chapter 27 | Contribution of Tipu Sultan to Rocket Technology   | 143 |
| Chapter 28 | The Contributions of Al - Khazini in the Development of<br>Hydrostatic Balance and its Functionality | 147 |
| Chapter 29 | The Contribution of Banu Musa Brothers in the Self Changing<br>Fountain                              | 155 |
| Chapter 30 | The Invention of the Helium-Neon Gas Laser by Ali Javan  | 160 |
| Chapter 31 | Al-Jazari on Automata  | 165 |

## CHAPTER EIGHT

### THE CONTRIBUTION OF IBN AL-AWWAM IN BOTANY AND AGRICULTURE

Mohd Hider Kamarudin, Waleed F. Faris

Fac. of Eng., International Islamic Univ. Malaysia (IIUM), Jalan Gombak, 53100 Kuala Lumpur, Malaysia.

#### 8.1 INTRODUCTION

The main objective of this chapter is to discuss and deliberate on the contribution of Ibn Al-Awwam in relation to the advancement of botanical science and agriculture. The significance of this chapter is for the people especially the new generations to appreciate the findings and thinking of the people of historical age, particularly the Muslim's scientists and their works so that the people in the present state could mere develop a new thought or findings. The methodology adopted in this chapter is web base research and by looking into the ancient Islamic civilization and find out the contribution of an ancient Muslim's scientist in the field of Botany and Agriculture.

#### 8.2 IBN AL-AWWAM THROUGH HISTORY

Ibn Al-Awwam gives so many contributions on the field of agriculture and he also the author of a famous treatise on agriculture entitled *Kitab Al-Filaha*, which is considered to be the most important Muslim work as well as the most important mediaeval one on the subject. Ibn Al-Awwam revolutionizes agricultural field during the Islamic civilization era as for almost every civilization, agriculture has always been the main activities as it provides food and various herbs for medicinal purpose to the people. Agricultural activities started as people trying to understand the knowledge about plants and their usage and Botanical science at the time was mostly studied in relations to plant use in medicine and food. (Andrew, 1974)

Muslim Spain, called Andalusia, was a prosperous region from the Arabic conquest in the 700s through the 1100s, and it became the center of important cultural advances that included pharmacological and agricultural writings (Glick, 1979, pp. 253–257). Ibn Al-Awwam Al-Ashbili was one of the famous writers on agriculture during the Islamic Golden Age in Spain. His valuable book entitled *Kitab Al-Filahah* is based on the works of his Greek, Roman, Nabatean and Ancient scientist predecessors discussing on the culmination of the tradition in agriculture. Moreover, the book also includes Ibn Al-Awwam's personal observations regarding agriculture. The book was divided into two parts consisting of 35 chapters and every chapter deals with some definite topics concerning agriculture. (Aktar ana Paramasivam, 2008)