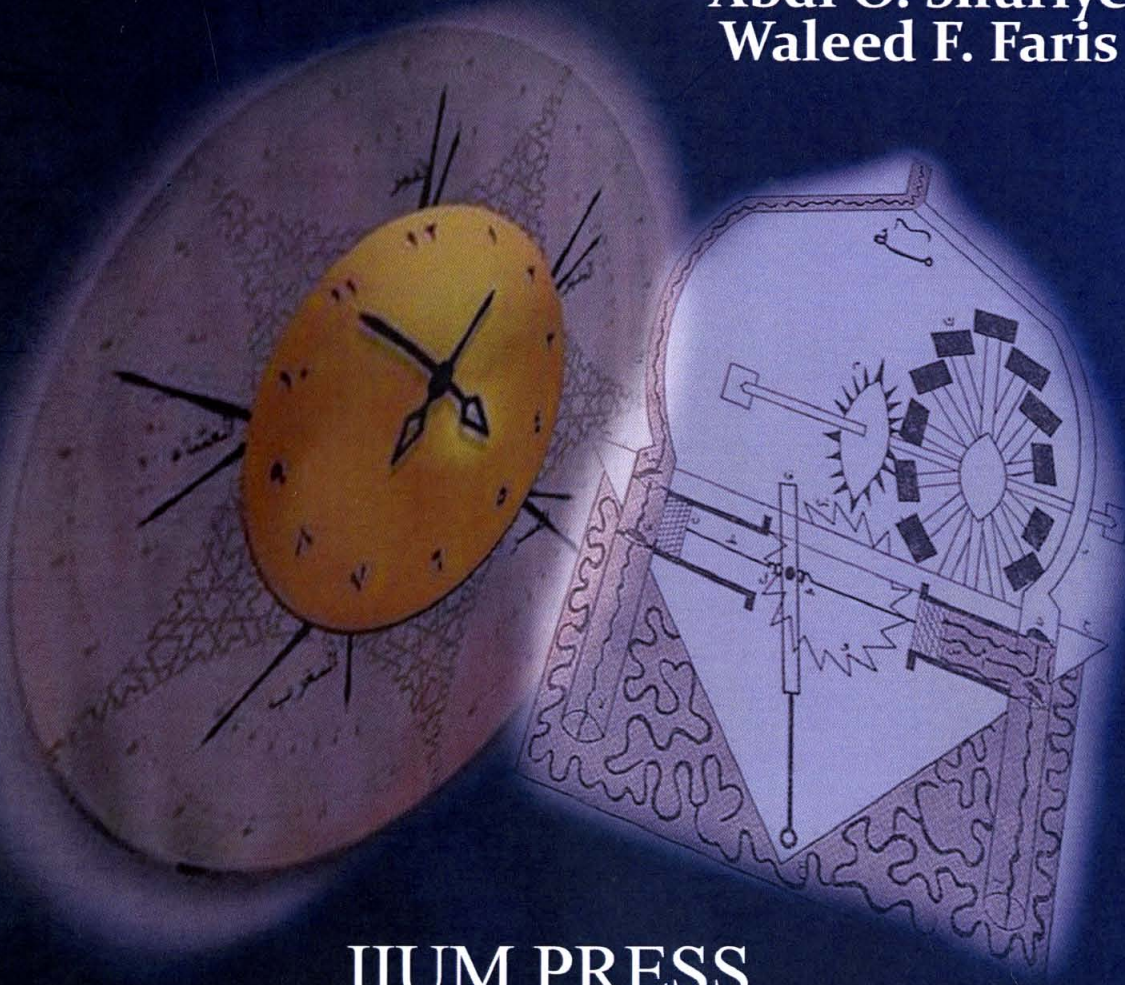


Contributions of Early Muslim Scientists to Engineering Studies and Related Sciences

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 I-Zarqali on Instrumentation	19
Chapter 5 Contributions of Al-Razi on Alchemy in Terms of Metal 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 and Rocket Technology	36
Chapter 8 The Contribution of Ibn Al-Awwam in Botany 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 Particles Theory in Quantum Physics	86
Chapter 18 The Contribution of Ibn Ishaq Al-Kindi to Light, Optics and 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 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 Hydrostatic Balance and its Functionality	147
Chapter 29	The Contribution of Banu Musa Brothers in the Self Changing Fountain	155
Chapter 30	The Invention of the Helium-Neon Gas Laser by Ali Javan	160
Chapter 31	Al-Jazari on Automata	165

CHAPTER NINE

AL-BATTANI CONTRIBUTIONS IN ASTRONOMY AND MATHEMATICS

Mohammad Salah Aldin Abdullatif, Jamal I. Daoud

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

9.1 INTRODUCTION

This chapter is talking about one of the famous and greatest Islamic astronomers and mathematicians around the world; Al-Battani has great and significant contributions in astronomy and mathematics. In astronomy, he has astronomical observations for more than forty years. In addition, he did some corrections upon Ptolemy's results and made some new tables of the Sun and the Moon. Moreover, he determined the length of solar year. In mathematics, he innovated new relationships in trigonometric, and created a table of cotangents, and made some formulas in spherical trigonometry.

Al-Battani wrote many books related to astronomy, and mathematics. He wrote the following books, *Kitab Al-Zij* known as *Al-Zij Al-Sabi*. And this book is considered as the most significant work because it covered many points that are not had taken before. In addition, he wrote a book titled *Commentary on Ptolemy's Tetrabiblos*, he corrected numerous errors of Ptolemy's. The purpose of his *Zij* was practical more than theoretical. In mathematics, he discovered new relationships in trigonometric. He could determine the angle of eclipse accuracy, and he also gave the length of solar year.

Al-Battani's full name is Mohammed ibn Jabir ibn Sinan Al-Harrani Al-Battani, also known as Albategnius or Albatenius was born in 858 in Harran near Urfa which is now in Turkey. He lived and worked in Al-Rakka, which is now a city in Syria. Battani was born in a family of Sabians, this religious group worship stars, and centred in Harran that has many scholars like Thabit ibn Qurra. However, Al-Battani's first name Mohammed and his Kunya Abu Abdullah indicates that he was certainly Muslim. Al-Battani died in 929 in Qasr Al-Jiss, Iraq.

The methodology adopted in this chapter is analytical. This chapter investigates what Al-Battani did for astronomy and mathematics and show briefly his significant contributions. The main focuses in this chapter is to provide answers of one of the greatest scientists in astronomy, and to show some of his contributions in astronomy and mathematics. The significant of this chapter is that there are few people who know Al-Battani, especially among Muslims; therefore, we propose to provide enough information about a good example of Muslim scientists who served the humanity along Islamic era.