Contributions of Early Muslim Scientists to Engineering Studies and Related Sciences

Abdi O. Shuriye
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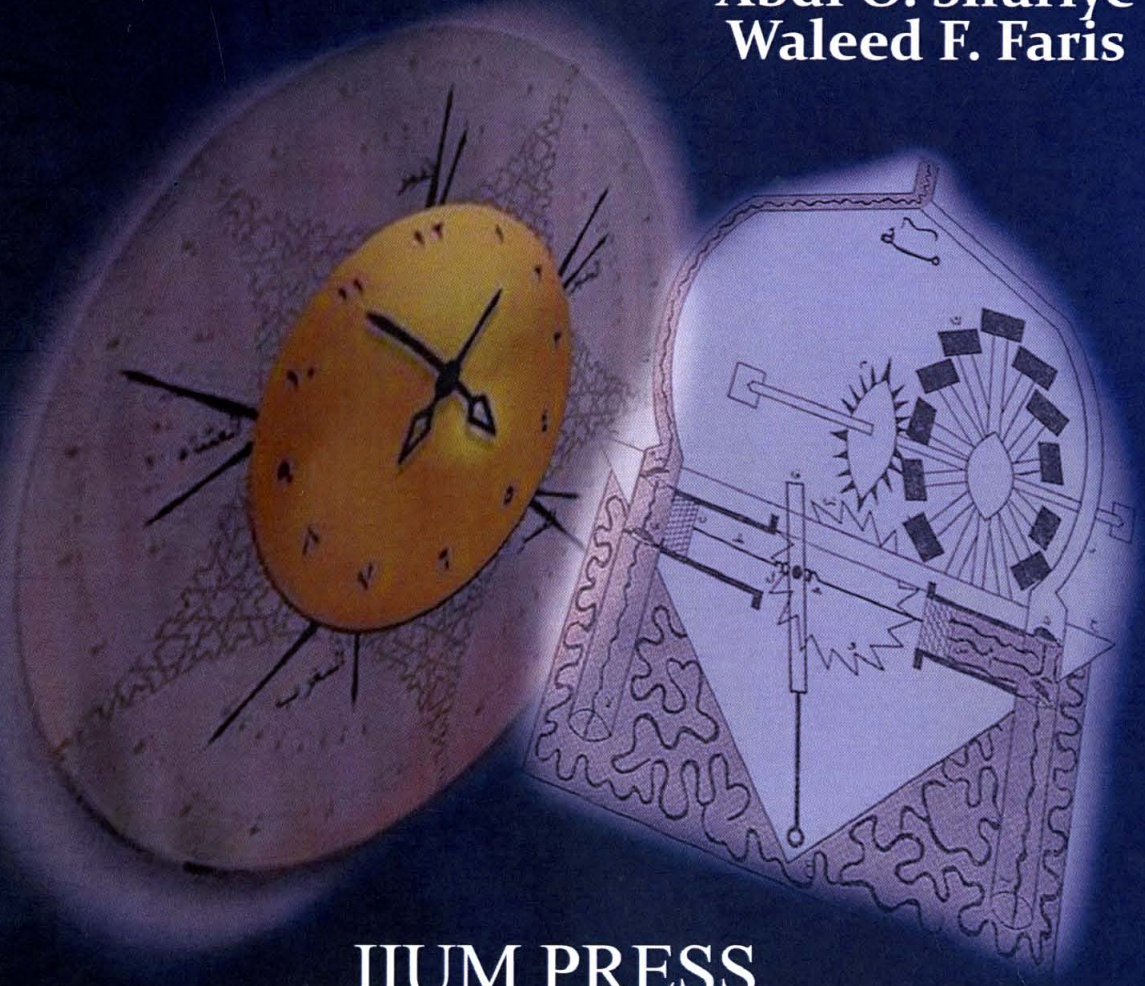

IIUM PRESS
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

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IIUM Press

Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011

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
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AL-ZARQALI ON INSTRUMENTATION

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4.1 INTRODUCTION

The objective of this chapter is to describe the innovation of Al-Zarqali. There were various astronomers during the Golden Age who flourished in the Muslim World, among them Abu Ishaq Ibrahim ibn Yahya Al-Zarqali. He is considered to be an instrument maker, mathematician and a foremost astronomer of his time

4.2 HISTORY

Achievements of Al-Zarqali were many but his focus of research was on astronomy. It is a well-known fact that importance of a subject is given only when one seeks that field acutely. Al-Zarqali's gave importance to astronomy and thus he created instruments to achieve easy readings. Al-Zarqali carried out observations one after another at Toledo[Al-Tulaytalah] and made a compilation. This compilation is the well-known Toledan Tables. These are astronomical tables which were used to predict the positions of the Sun, Moon and the other planets relative to the fixed stars. He made corrections to some of the geographical data from Ptolemy and Al-Khwarizmi. Both are well known for their immense contributions to the field of astronomy and mathematics. To be specific, Al-Zarqali made some corrections to the work of Ptolemy's estimate of the length of the Mediterranean Sea. The Toledo Tables were translated into Latin in the Twelfth century.

Al-Zarqali was the first person to prove conclusively the motion of the Aphelion relative to the stars. The Aphelion is the point on a planet orbit that is farthest from the Sun. Combining theoretical knowledge with technical skill, he excelled at the construction of precision instruments for astronomical use. He constructed a flat astrolabe which is a universal instrument and can be used in any place and at any latitude. Its details were published in many languages which included Latin, Hebrew and several European languages. He also constructed a water clock which is able to find the hours of the day and the night of the lunar months [ElSaadawy, n.d.].

Al-Zarqali wrote a treatise on the construction of an instrument known as the equatorium. In this chapter, one of the focuses will be on this instrument. This instrument is used for the computing the positions of the celestial bodies. This work was translated into Spanish in the thirteen century by order of King Alfonso X. This could be found in a section of Libros del Saber de Astronomia. Copernicus (1473-1543) who was Renaissance astronomer expresses his indebtedness to Al-Zarqali (Arzachel) and quotes his work several times. In the work Der Mond (1837), Beer and Madler mention a surface of the moon named as Arzachel after Al-Zarqali. It is more than sixty miles in diameter and it is