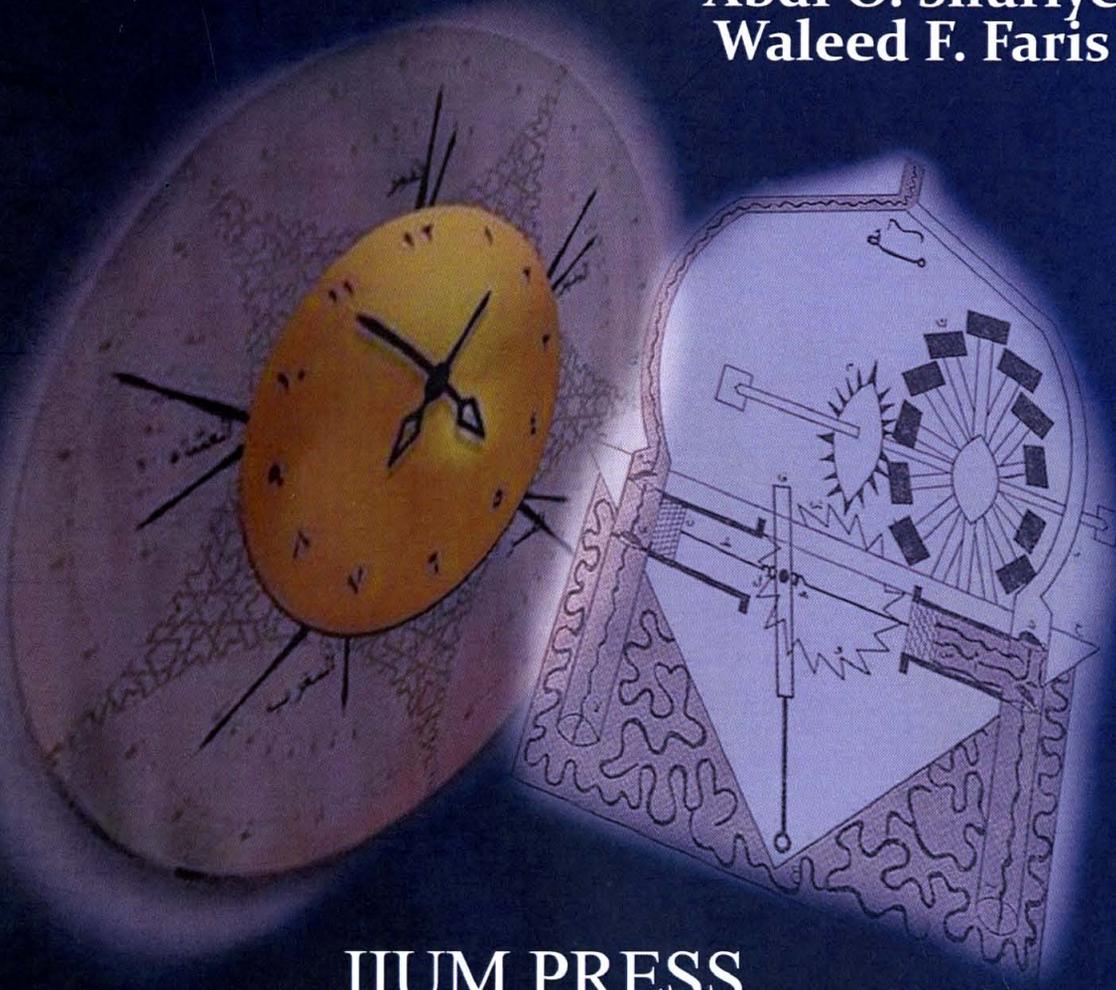


# Contributions of Early Muslim Scientists to Engineering Studies and Related Sciences

Abdi O. Shuriye  
Waleed F. Faris



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INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA



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## **Editors**

Abdi O. Shuriye  
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## CHAPTER TWELVE

### NASIR AL-DIN AL-TUSI'S UNDERSTANDING OF TRIGONOMETRY

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#### 12.1 INTRODUCTION

The methodology adopted in this chapter is library and internet based. The data used were collected from dependable sources. The objective of this chapter is to investigate the understanding of Nasir al-Din al-Tusi's work in trigonometry and to derive and analyze the scope of sine law which initiated by al - Tusi. The significance of this chapter is the usefulness of the sine law to various fields such as astronomy, geography and medicine. Trigonometry is a branch of mathematics concerned with specific functions of angles and their application to calculations. It is derived from two Greek words *trigon* meaning "triangle" and *metron* meaning "a measurement". Hence, it is a methodology for finding some unknown elements of triangle provided the data include a sufficient amount of linear and angular measurements to define a shape. .

According to (R. Nagel, 2002), the field of trigonometry evolved during the third century BC as a branch of geometry used extensively for astronomical studies. It was developed when there was a need to compute angles and distances in such fields as astronomy, map making, surveying, and artillery range finding. Two areas evolved the plane trigonometry and spherical trigonometry. Plane trigonometry covers problem with angle and distance in one plane while spherical trigonometry is applied to problems in more than one plane of three-dimensional space.

Modern trigonometry began with the Greeks, Hipparchus (190-120BC) was the first to construct a table of value for trigonometry functions, however the use of symbols as used today was not known during this period, and rather formulas were expressed in purely geometric terms as relationship between the chord and angles. At one point or another, various contributors to trigonometry spread throughout the ages from Greek, Indian, Islam, Chinese and European. In addition, hundreds of scholars from generation to generation such as Nasir al Din al-Tusi contributed to the field of trigonometric.

Abu Jafar Muhammad ibn Muhammad ibn al Hassan Nasir al Din al-Tusi was born on 18 February 1202 in Tus, Khorasan (O. Echi, 2009 pp.28-32). Some of the Arab- Tunis scholar such as ibn khaldun (1332-1406) considered him to be the greatest of the late Persian scholars (Encyclopedia Britannica, 2007). He was one of the Islamic scholars who contributed immensely in the of field science, such as astronomy, medicine, theology and trigonometry, a branch of mathematics. He learnt sciences and philosophy from Kamal al-