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ABSTRACT

7 The Fascination of Geometry in Indian Mathematics, with Special Reference to Kerala Mathematics by Prof. TG Sarachandran, Deputy Director [Retd.], Collegiate Education, Kottayam

It was a stormy development that took place in Kerala in the fields of Astronomy and Mathematics in the post-Bhāskara period. Mathematicians from Vararuci to Śaṅkaravarman contributed in no small measure to this field. Later discoveries in Europe were anticipated by Kerala mathematicians at least 200 to 300 years earlier.

We aim at a presentation of some developments in geometry during this period. Kriyākramakarī, which is a commentary on Līlāvati, contains a number of results related to the cyclic quadrilateral. Several trigonometric identities like

$$\sin^2 A - \sin^2 B = \sin(A + B)\sin(A - B)$$

$$\sin A \sin B = \sin^2\left(\frac{A + B}{2}\right) - \sin^2\left(\frac{A - B}{2}\right)$$

are proved using the properties of the cyclic quadrilateral. A formula for the area of a cyclic quadrilateral in terms of the 'three' diagonals is also given. A proof is outlined in the Yuktibhāṣā.

The use of algebraic methods to prove geometric results is novel in Indian mathematics. We would like to illustrate the interplay of algebra and geometry, one complementing the other, in proving basic results. A proof of the Pythagoras theorem as outlined in Yuktibhāṣā is also noteworthy.