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Entitled

SUM OF SQUARES WITH Q-SERIES, GOSPER'S Q-TRIGONOMETRY, AND NEW IDENTITIES VIA AN EXTENDED BAILEY TRANSFORM

by

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1:00 PM
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Online Session

Abstract

This thesis is concerned about q-series and some of their applications. Firstly, Jacobi's q-series proof for Legendre's theorem on sums of four squares will be presented. By way of comparison, the classical approach of this result will be also discussed. Secondly, Gosper's q-trigonometry will be introduced using Jacobi's theta functions and the theory of elliptic functions shall be employed to confirm one of Gosper's conjectures. As an application, a proof for Fermat's theorem on the sums of squares will be provided. Thirdly, an extended version of Bailey's transform will be established and as a consequence a variety of new q-series identities will be proved. Some of these identities involve the q-binomial coefficients.

Keywords: q-series, q-trigonometry, Bailey transform, sums of squares, q-analogues.