South East Asian J. of Math. & Math. Sci. **ISSN : 0972-7752**
Vol.11, No.1 2015, pp. 47-54

On Certain New WP Bailey Pairs and Their Applications

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Abstract: In this paper, we have established new WP Bailey pairs by making use of summation formulae due to Verma and Jain. Further, this new WP Bailey pair has been used to obtain certain transformation formulae for basic (q-) hypergeometric series.

Keywords and phrases: WP Bailey pair, summation formula, transformation formula.

2000 A.M.S. subject classification: Primary 33D15, Secondary 11B65

1. Introduction, Notations and Definitions

We employ the usual notations

$$[a;q]_n = (1-a)(1-aq)...(1-aq^{n-1}), \qquad n = 1,2,3,...,$$

$$[a;q]_0 = 1,$$

$$[a_1,a_2,...,a_r;q]_n = [a_1;q]_n[a_2;q]_n...[a_r;q]_n.$$

and for $|q|<1$,

$$[a;q]_\infty = \prod_{r=0}^{\infty}(1-aq^r),$$

$$[a_1,a_2,...,a_r;q]_\infty = [a_1;q]_\infty[a_2;q]_\infty...[a_r;q]_\infty.$$

The basic hypergeometric series is defined as,

$${}_r\Phi_s\left[\begin{array}{l} a_1,a_2,...,a_r;q;z \\ b_1,b_2,...,b_s \end{array}\right] = \sum_{n=0}^{\infty}\frac{(a_1,a_2,...,a_r;q)_n z^n}{(q,b_1,b_2,...,b_s;q)_n}\left\{(-)^n q^{n(n-1)/2}\right\}^{1+s-r}, \quad (1.1)$$

where for convergence max.$(|z|,|q|)<1$, if $1+s=r$ and for $1+s>r$, $|z|<\infty$.
A WP Bailey pair is a pair of sequences $\langle\alpha_n(a,k,q),\beta_n(a,k,q)\rangle$ satisfying

$$\alpha_0(a,k,q) = \beta_0(a,k,q) = 1$$