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On certain transformation formulae for q-hypergeometric series

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Abstract: In this paper, certain transformation formulae have been established by using the summation formulae for truncated q- series.
Keywords and Phrases: q- Hypergeometric series, Summation formulae, truncated q-series, transformation formula.
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1. Introduction, Notations and Definitions

Transformation theory is a beautiful tool of special functions that plays an important role to provide a platform for the development of the interesting and useful results. In this paper, we have established certain transformation formulae for basic hypergeometric series.

As usual, for a and q complex numbers with $|q| < 1$, define

$$[a;q]_0 = 1, \qquad [a;q]_n = (1-a)(1-aq)(1-aq^2)...(1-aq^{n-1}), \text{ for } n \in N.$$

$$[a_1, a_2, a_3, ..., a_r; q]_n = [a_1;q]_n[a_2;q]_n...[a_r;q]_n$$

and

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

An ${}_r\Phi_s$ basic hypergeometric series is define by

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

In 2010, J.M. laughlin and P. Zimmar [] established the following theorem.

If $\alpha_n(a,k)$ and $\beta_n(a,k)$ are sequences satisfying the relation

$$\beta_n(a,k) = \sum_{r=0}^{n} \frac{[k/a;q]_{n-r}[k;q]_{n+r}}{[q;q]_{n-r}[aq;q]_{n+r}}\alpha_r(a,k) \tag{1.1}$$