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On certain transformations of basic hypergeometric functions

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Abstract: In this paper we shall attempt to establish certain interesting transformation of basic hypergeometric functions by exploiting certain known summation formulae.
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1. Notations

For any numbers a and q, real or complex and $|q| < 1$, let

$$[\alpha; q]_n \equiv [\alpha]_n = \begin{cases} (1-\alpha)(1-\alpha q)(1-\alpha q^2)...(1-\alpha q^{n-1}); & n > 0 \\ 1 & ; \quad n = 0 \end{cases} \tag{1.1}$$

Accordingly, we have

$$[\alpha; q]_\infty = \prod_{n=0}^{\infty}(1-\alpha q^n)$$

Also,

$$[a_1, a_2, a_3, ..., a_r; q]_n \equiv [a_1; q]_n[a_2; q]_n[a_3; q]_n...[a_r; q]_n. \tag{1.2}$$

Now, we define a basic hypergeometric function

$${}_r\Phi_s \left[\begin{matrix} a_1, a_2, ..., a_r; q; z \\ b_1, b_2, ..., b_s; q^\lambda \end{matrix} \right] = \sum_{n=0}^{\infty} \frac{[a_1; q]_n[a_2; q]_n...[a_r; q]_n z^n}{[q; q]_n[b_1; q]_n[b_2; q]_n...[b_s; q]_n} \quad . \tag{1.3}$$

valid for $|q| < 1, \quad \lambda > 0$ and if $\lambda = 0$ then for $|z| < 1$.