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On Bilateral Bailey Transform and its Applications

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Abstract: In this paper, making use of bilateral Bailey transform, certain interesting transformations of basic bilateral hypergeometric functions have been established.
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1. Introduction, Notations and Definitions

Throughout this paper we shall adopt the following notations and definitions
For any number a and q, real or complex and $|q| < 1$,

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

Accordingly, we have

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

Also

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

and

$$[a;q]_{-n} = \frac{q^{n(n+1)/2}}{(-a)^n[q/a;q]_n} \tag{1.2}$$

Following Gasper and Rahman [2] we define a basic hypergeometric series,

$$_r\Phi_s\left[\begin{array}{l} a_1, a_2, ..., a_r; q; z \\ b_1, b_2, ..., b_s \end{array}\right]$$

$$= \sum_{n=0}^{\infty}\frac{[a_1, a_2, ..., a_r; q]_n z^n\{(-)^n q^{n(n-1)/2}\}^{1+s-r}}{[q, b_1, b_2, ..., b_s; q]_n}, \tag{1.3}$$