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Transformation formulae for poly-basic hypergeometric series

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Abstract: In this paper, we have established some very interesting transformation formulae for poly-basic hypergeometric series.
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1. Introductions, Notations and Definitions:

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

$$[a;q]_0 = 1$$
$$[a;q]_n = (1-a)(1-aq)(1-aq^2)...(1-aq^{n-1}), \quad \text{for } n \in N,$$
$$[a_1, a_2, a_3, ..., a_r; q]_n = [a_1;q]_n [a_2;q]_n [a_3;q]_n ... [a_r;q]_n ,$$
$$[a;q]_\infty = \prod_{r=0}^{\infty}(1-aq^r).$$

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

$$ {}_r\Phi_s \left[\begin{array}{l} a_1, a_2, a_3, ..., a_r; q; z \\ b_1, b_2, b_3, ..., b_s \end{array} \right]$$
$$= \sum_{n=0}^{\infty} \frac{[a_1, a_2, a_3, ..., a_r; q]_n}{[q, b_1, b_2, b_3, ..., b_s; q]_n} \left[(-)^n q^{n(n-1)/2}\right]^{1+s-r} z^n. \qquad (1.1)$$

A poly-basic hypergeometric series is defined as,

$$\phi \left[\begin{array}{l} a_1, a_2, ..., a_r : c_{1,1}, ..., c_{1,r_1}; ...; c_{m,1}, ..., c_{m,r_m}; q, q_1, ..., q_m; z \\ b_1, b_2, ..., b_s : d_{1,1}, ..., d_{1,s_1}; ...; d_{m,1}, ..., d_{m,s_m} \end{array} \right]$$