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On Transformation Formulae for theta hypergeometric functions

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Abstract: In this paper, making use of an identity and certain summation formulae for truncated theta hypergeometric series, we have established transformation formulae for finite-bilateral theta hypergeometric series.
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1. Introduction, Notations and Definitions

Elliptic hypergeometric series and their extensions to theta hypergeometric series has become an increasingly active area of research these days. In the present paper, we have established transformation formulae for bilateral theta hypergeometric series. Special cases of the results established in this paper have also been deduced.

A modified Jacobi's theta function with argument x and nome p is defined by

$$\theta(x;p) = [x;p]_\infty [p/x;p]_\infty \equiv [x, p/x;p]_\infty \tag{1.1}$$

$$\theta(x_1, x_2, ..., x_r; p) = \theta(x_1;p)\theta(x_2;p), ..., \theta(x_r;p)$$

and

$$[x;p]_\infty = \prod_{r=0}^{\infty}(1 - xp^r).$$

Following Gasper and Rahman [1; Chapter 11 (11.2.5) and (11.2.53)] theta shifted factorial is defined by,

$$[a;p,q]_n = \begin{cases} \theta(a;p)\theta(aq;p)...\theta(aq^{n-1};p); & \text{for } n > 0 \\ 1, & \text{n=0,} \end{cases}$$