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ON HYPERGEOMETRIC PROOF OF CERTAIN CONTINUED FRACTION RESULTS

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Abstract :

In this paper, we provide hypergeometric proof of certain results and deduce a number of new and known results. This result is equivalent to Entry 12 of Chapter XVI of Ramanujan's second Notebook.

Keywords and Phrases : Basic hypergeometric functions, q-series, continued fractions, Ramanujan's theta functions,

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1. INTRODUCTION, NOTATION AND DEFINITION

Ramanujan's contribution to continued fractions associated with analytic functions is remarkable. His Notebooks contain a large number of beautiful results associated with hypergeometric functions (both, basic and ordinary) and continued fractions. Many of his continued fraction results can be provided with hypergeometric proof. In a recent publication Denis and Singh [2, 3] provided hypergeometric proof of Entries 25 and 33 of Chapter XII of Ramanujan's [5] Second Notebook, and also provided their basic analogues.

Motivated by the above results, we propose to provide hypergeometric proof of the following results.

$$\frac{[a^2q^3, b^2q^3; q^4]_\infty}{[a^2q, b^2q; q^4]_\infty} = \frac{1}{1-a^2q\ -}\,\frac{q(b^2-a^2q^2]}{1+q^2\ +}\,\frac{q(a^2-b^2q^2)}{(1-a^2q)(1+q^4)\ -}\,\frac{(q^5(b^2-a^2q^6)}{1+q^6\ +}$$

$$\frac{q(a^2-b^2q^6)}{+(1-a^2q)(1+q^8)}\ -\frac{q^9(b^2-a^2q^{10})}{1+q^{10}+.......} \tag{1.1}$$

where $\quad [\alpha,\beta;p]_\infty = [\alpha;p]_\infty[\beta;p]_\infty \quad$ and $\quad [\alpha;p]_\infty = \prod_{r=0}^{\infty}(1-\alpha p^r), |\, p \,| < 1.$