South East Asian J. Math. & Math. Sc.
Vol.6 No.2(2008), pp.121–122

A BILATERAL EXTENSION OF SECOND ORDER MOCK THETA FUNCTIONS

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(*Received: February 02, 2008*)

Dedicated to Professor G. E. Andrews on his seventieth birthday

Abstract: We introduce a bilateral extension of two second mock theta functions and establish a new identity connecting the two functions.

Keywords and Phrases: Mock theta functions, basic, q-series, Ramanujan's sum
2000 AMS Subject Classification: 33D15

1. Preliminaries and Results

Recently, McIntosh [1] has introduced three second order mock theta functions defined by the following q-series

$$\begin{aligned} A(q) &= \sum_{n=0}^{\infty} \frac{q^{(n+1)^2}(-q;q^2)_n}{(q;q^2)_{n+1}^2} = \sum_{n=0}^{\infty} \frac{q^{n+1}(-q^2;q^2)_n}{(q;q^2)_{n+1}} \\ B(q) &= \sum_{n=0}^{\infty} \frac{q^{n^2+n}(-q^2;q^2)_n}{(q;q^2)_{n+1}^2} = \sum_{n=0}^{\infty} \frac{q^{n}(-q;q^2)_n}{(q;q^2)_{n+1}} \\ C(q) &= \sum_{n=0}^{\infty} \frac{(-1)^n q^{n^2}(q;q^2)_n}{(-q^2;q^2)_n^2}, \end{aligned}$$

where

$$\begin{aligned} (a;q^k)_n &= (1-a)(1-aq)\cdots(1-aq^{k(n-1)}), \quad n>0 \\ (a)_0 &= 1. \end{aligned}$$

In the present short communication, we introduce the following bilateral