ON THE Q-EXTENSION OF THE P-ADIC BETA FUNCTION

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MSC 2000: 11S80, 33D05

Abstract

Let p be a fixed prime number. By $\mathbb{Z}_p, \mathbb{Q}_p$ and $\mathbb{C}_p$ we denote the ring of p-adic integers, the field of p-adic numbers and the completion of the algebraic closure of $\mathbb{Q}_p$, respectively. Y. Morita (1975) defined the $p-$adic gamma function $\Gamma_p : \mathbb{Z}_p \to \mathbb{Q}_p$ by the formula

$$\Gamma_p(x) = \lim_{n\to x}(-1)^n \prod_{\substack{1\le j<n \\ (j,p)=1}} j$$

Let $q \in \mathbb{C}_p$ with $|q-1|_p < 1$ and $q \neq 1$, the q-extention of the $p-$adic gamma function is defined by

$$\Gamma_{p,q}(x) = \lim_{n\to x}(-1)^n \prod_{\substack{1\le j<n \\ (j,p)=1}} \frac{1-q^j}{1-q} \quad \text{for } x \in \mathbb{Z}_p,$$

where n runs over pozitive integers. We recall that $\underset{q\to 1}{lim}\Gamma_{p,q} = \Gamma_p$.

In the present work we consider the q-extention of the $p-$adic beta function which is defined by

$$B_{p,q}(x,y) = \frac{\Gamma_{p,q}(x)\,\Gamma_{p,q}(y)}{\Gamma_{p,q}(x+y)}.$$

We obtain some properties of the q-extention of the $p-$adic beta function $B_{p,q}$.

Keywords and phrases: p-adic number, q-extention of the p-adic gamma function, q-extention of the $p-$adic beta function.

References

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