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A STUDY ON q-ANALOGUE OF DEGENERATE $\frac{1}{2}$-CHANGHEE NUMBERS AND POLYNOMIALS

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Abstract: The aim of the paper is to introduce q-analogue of degenerate $\frac{1}{2}$-Changhee numbers $Ch_{n,q,\lambda,\frac{1}{2}}$ with the help of a p-adic q-integral on $\mathbb{Z}_p$ and derive explicit expressions and some identities for those numbers. In more detail, we deduce explicit expressions of $Ch_{n,q,\lambda,\frac{1}{2}}$, as a rational function in terms of Euler number and Stirling numbers of the first kind, as a fermionic p-adic q-integral on $\mathbb{Z}_p$.

Keywords and Phrases: Degenerate Catalan numbers, q-analogue of degenerate $\frac{1}{2}$-Changhee numbers, p-adic q-integral on $\mathbb{Z}_p$.

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1. Introduction

Let p be a fixed odd prime number. Throughout this paper, $\mathbb{Z}_p$, $\mathbb{Q}_p$ and $\mathbb{C}_p$ will denote the ring of p-adic integers, the filed of p-adic rational numbers and the completion of an algebraic closure of $\mathbb{Q}_p$. The p-adic norm $|\ .\ |_p$ is normalized by $|\ p\ |_p = \frac{1}{p}$. Let $C(\mathbb{Z}_p)$ be the space of continuous function on $\mathbb{Z}_p$. Let q be an indeterminate in $\mathbb{C}_p$ with $|\ 1-q\ |_p < 1$ and q-extension of x is defined by $[x]_q = \frac{1-q^x}{1-q}$. Then the fermionic p-adic q-integral of f on $\mathbb{Z}_p$ is defined by Kim as follows

$$I_{-q}(f) = \int_{\mathbb{Z}_p} f(x) d\mu_{-q}(x) = \lim_{N\to\infty} \sum_{x=0}^{p^N-1} f(x)\mu_{-q}(x + p^N\mathbb{Z}_p),$$