

THE r -GENERALIZATION OF POLY-BERNOULLI NUMBERS

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Bernoulli numbers B_n ($n \in \mathbb{Z}$, $n \geq 0$) play an important role in various contexts of mathematics. In the 1990s, Kaneko introduced poly-Bernoulli numbers $B_n^{(m)}$ ($m, n \in \mathbb{Z}$, $n \geq 0$) such that they give back ordinary Bernoulli numbers for $m = 1$. It turned out that if this upper parameter is nonpositive, then poly-Bernoulli numbers can be expressed as sums of terms containing products of Stirling numbers of the second kind, hence they have positive integer values. Later, some combinatorial meanings appeared in the literature.

Since the so-called r -generalization of Stirling numbers is widely studied, our goal was to find the generalization of poly-Bernoulli numbers connected to these r -Stirling numbers of the second kind which have interesting interpretations. These include enumerating permutations where the difference of every element and its image is restricted (in the proof we have to count matchings in certain bipartite graphs), acyclic orientations of complete multipartite graphs, and families of uniquely reconstructable matrices in discrete tomography.

This is a joint work with Fanni Simán.