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Finite multiple zeta values associated with 2-colored rooted trees

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# FINITE MULTIPLE ZETA VALUES ASSOCIATED WITH 2-COLORED ROOTED TREES

MASATAKA ONO

ABSTRACT. We define finite multiple zeta values (FMZVs) associated with some combinatorial objects, which we call 2-colored rooted trees, and prove that FMZVs associated with 2-colored rooted trees satisfying certain mild assumptions can be written explicitly as  $\mathbb{Z}$ -linear combinations of the usual FMZVs. Our result can be regarded as a generalization of Kamano's recent work [K] on finite Mordell-Tornheim multiple zeta values. As an application, we will give a new proof of the shuffle relation of FMZVs, which was first proved by Kaneko and Zagier.

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## 1. INTRODUCTION

In the 1990's, Hoffman [H2] and Zhao [Z] had started independently a theory of mod  $p$  multiple harmonic sums. Recently, Kaneko and Zagier introduced a new “adelic” framework to describe the work of Hoffman and Zhao. That is, they defined the  $\mathbb{Q}$ -algebra  $\mathcal{A} := \left( \prod_p \mathbb{F}_p \right) / \left( \bigoplus_p \mathbb{F}_p \right)$ , where  $p$  runs through all rational primes. Thus, an element of  $\mathcal{A}$  is represented by a family  $(a_p)_p$  of elements  $a_p \in \mathbb{F}_p$ , and two families  $(a_p)_p$  and  $(b_p)_p$  represent the same element of  $\mathcal{A}$  if and only if  $a_p = b_p$  for all but finitely many rational primes  $p$ .

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