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Title. Order structure and derived sequence of the set of multiple zeta values

Abstract. Multiple zeta values are the real numbers defined by the convergent series

$$(1) \quad \zeta(a_1, \dots, a_r) := \sum_{n_1 > n_2 > \dots > n_r \geq 1} \frac{1}{n_1^{a_1} \dots n_r^{a_r}},$$

where a_1, \dots, a_r are positive integers with $a_1 > 1$. They are generalization of classical Riemann zeta values to more variables. In this talk, we shall classify all the convergent sequences of multiple zeta values which do not converge to 0. Using this classification, we will completely describe the iterated derived sets of the set of multiple zeta values in \mathbb{R} . Our results will imply that the set of multiple zeta values, ordered by \geq , is a well-ordered set. We will also determine its type of order, which is ω^3 , where ω is the order type of the set \mathbb{N} of positive integers. Finally, using these results we shall show that there are only finitely many multiple zeta values which all represent the same value. It is in fact expected that there are at most two multiple zeta values that represents the same value!