

A study on multiple zeta values from the viewpoint of zeta-functions of root systems

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We study multiple zeta values (MZVs) from the viewpoint of zeta-functions associated with the root systems which we have studied in our previous papers. In fact, the r -ple zeta-functions of Euler-Zagier type can be regarded as the zeta-function associated with a certain sub-root system of type C_r . Hence, by the action of the Weyl group, we can find new aspects of MZVs which imply that the well-known formula for MZVs given by Hoffman and Zagier coincides with Witten's volume formula associated with the above sub-root system of type C_r . Also, from this observation, we can prove some new formulas which especially include the parity results of double and triple zeta values. As another important application, we give certain refinement of restricted sum formulas, which gives restricted sum formulas among MZVs of an arbitrary depth r which were previously known only in the cases of depth $2, 3, 4$. Furthermore, considering a sub-root system of type B_r analogously, we can give relevant analogues of the Hoffman-Zagier formula, parity results and restricted sum formulas.

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