

Documents

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Enumeration of exponent three IP loops

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Abstract

Inverse Property Loops (IP Loops) are important algebraic structures that fall between loops and groups. Enumerating isomorphism classes of higher order IP loops is an arduous task due to enormous number of isomorphism copies. This paper describes a systematic approach to efficiently eliminate isomorphic copies, which reduces the time to enumerate isomorphism classes. Using the proposed approach, we count and enumerate exponent 3 IP loops of order 15. To the best of our knowledge, this count is reported for the first time in the literature. Further, we also computationally verify and enumerate the existing results for exponent 3 IP loops of order up to 13. The results show that even after applying stringent condition of exponent 3, a good number of isomorphism classes exist. However, when associativity property is applied, the total number of isomorphism classes reduces drastically. This provides an insight that instead of exponent 3 property, associativity is mainly responsible for the low population of isomorphism classes in groups.

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