

Characterization of Bol Loops of Small Orders.

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Abstract:

Finite Bol loops of small orders are characterised in this study. There exist up to isomorphism 6 non-associative Bol loops of order 8, 2 non-associative Bol loops of order $4p$ and every Bol loop of order $2p$ or p^2 is a group (where p is an odd prime). Some properties of loops satisfying identities of Bol-Moufang type are discussed. The common properties between these loops and loops satisfying Bol identity are investigated.

A general construction Theorem which yields Bol loops of order $2p^2$ is given. It is also proved that there exist only two non-isomorphic Bol loops of order $2p^2$. This settles some of the open problems stated by Niederreiter, H. and Robinson, K.H. concerning existence of Bol loops of orders 18, 50 and 98. It is also proved that there are $6(p + 7)$ and $-(p + 5)$, non-isomorphic Bol loops of order $3p$, when $31p-1$ and $31p-1$ respectively and that Bol loops of order $3p$ are isomorphic to their loop isotopes. These results are at variance with the claims of Niederreiter, H. and Robinson, K.H. Finally, it is proved that there exist a total of 472 non-isomorphic Bol loops of order 16. This result has been verified on the computer and the relevant programmes are listed in the Appendices.

Keywords: Bol loops/ Bol-Moufang

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