

# Maximal subloops of finite simple Moufang loops

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We continue the study of the properties of Moufang loops using their relation to groups with triality (A. N. Grishkov, A. V. Zavarnitsine, Lagrange's theorem for Moufang loops, to appear in *Math. Proc. Camb. Phil. Soc.*). We give a classification of the maximal subloops of the unique finite simple non-associative Moufang loops  $M(q)$ . It was shown in the paper referred to above that there exists a correspondence between the subloops of  $M(q)$  and certain subgroups of the simple group with triality  $P\Omega_8^+(q)$ . This correspondence becomes more natural when we bring into consideration the simple alternative algebra  $O(q)$  and its automorphism group  $G_2(q)$ . As a corollary to our results, we have the following description:

**Theorem:** *The maximal subloops of the simple Moufang loop  $M(q)$ ,  $q = p^n$ , are as follows:*

- (i)  $q^2 : PSL_2(q)$ , maximal parabolic;
- (ii)  $(PSL_2(q), 2)$ ,  $q \neq 3$ ;
- (iii)  $M(q_0)$ ,  $q = q_0^k$ ,  $k$  prime,  $(q, k) \neq (\text{odd}, 2)$ ;
- (iv)  $PGL(O(q_0))$ ,  $q = q_0^2$  odd;
- (v)  $M(2)$ ,  $q = p$  odd.

*Moreover, all isomorphic maximal subloops of  $M(q)$  are conjugate in  $\text{Aut}(M(q))$ .*