ON RECURSIVELY DIFFERENTIABLE QUASIGROUPS

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If $(Q,\cdot)$ is a binary groupoid then will denote its recursive derivative of order s by „ $\overset{s}{\cdot}$ ”, hence $x \overset{0}{\cdot} y = x \cdot y$, $x \overset{1}{\cdot} y = y \cdot xy$, K , $x \overset{s}{\cdot} y = (x \overset{s-2}{\cdot} y) \cdot (x \overset{s-1}{\cdot} y)$,

for every $x, y \in Q$. If the recursive derivatives „ $\overset{s}{\cdot}$ ”, s=1,2,…,k, of a binary quasigroup $(Q,\cdot)$ are quasigroup operations, then $(Q,\cdot)$ is called recursively *k*-differentiable. The notions of recursive derivatives and recursively differentiable quasigroups raised in the algebraic coding theory [1]. Recursively differentiable binary quasigroups in particular groups, are studied in the present paper.

Proposition 1. If a quasigroup $(Q,\cdot)$, with the left unit, is recursively 1-differentiable then the mapping $x \to x^2$ is a bijection.

Proposition 2. A diassociative loop $(Q,\cdot)$ is recursively 1-differentiable if and only if the mapping $x \to x^2$ is a bijection.

Corollary 1. A Moufang loop $(Q,\cdot)$, in particular a group, is recursively 1-differentiable if and only if the mapping $x \to x^2$ is a bijection on Q.

Corollary 2. Finite groups of even order are not recursively 1-differentiable.

References:

1. Couselo E., Gonzalez S., Markov V., Nechaev A., Recursive MDS-Codes and recursively differentiable quasigroups, Discret. Mat. 10 (1998), no. 2,3-29 (in Russian).