Some properties of a permutation representation of a group by cosets to its included subgroups

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All necessary definitions and notations it can be found in [1,2].

Theorem 1. *Let G be a group and $H \subseteq K \subseteq G$ be its two included subgroups. Let set $T = \{t_{i,j}\}_{i\in E_1, j\in E_2}$ be a loop transversal in G to H and set $T_1 = \{t_{0,j}\}_{j\in E_2}$ be a corresponding loop transversal in K to H. So there exist the loop transversal operation $L = \langle E, \cdot\rangle$, corresponding to the transversal T, and its subloop - loop transversal operation $L_1 = \langle E_2, \cdot\rangle$, corresponding to the transversal T_1. Also there exist folllowing three permutation representations:*

1. *a permutation representation* $\hat{G}$ *of the group* G *by the left cosets to its subgroup* H*;*
2. *a permutation representation* $\check{G}$ *of the group* G *by the left cosets to its subgroup* K*;*
3. *a permutation representation* $\breve{L}$ *of the loop* L *by the left cosets to its subloop* L_1*.*

Then the following afirmations are true:

a *The kernel* $Core_G(H)$ *of the permutation representation* $\hat{G}$ *is a multiplication group of the loop* $Core_L(L_1)$ *- the kernel of the permutation representation* $\breve{L}$*;*

b *For every* $g \in G$*:*

$$\hat{g}(\langle x, y\rangle) = \langle u, v\rangle \Leftrightarrow \check{g}(x) = u,\ \check{g}(y) = v.$$

Bibliography

[1] Kuznetsov E., *Transversals in loops.1.Elementary properties*, Quasigroups and related systems, No. 1 **18**(2010), 43–58.

[2] Kuznetsov E., *Transversals in groups.1.Elementary properties*, Quasigroups and related systems, No. 1, **1**(1994), 22–42.