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In memoriam: Galina B. Belyavskaya (1940 – 2015)

Galina Borisovna Belyavskaya (19.04.1940–07.05.2015)

Galina Borisovna Belyavskaya, the greatest woman-mathematician in Moldova, passed away at a hospital on May 7, 2015, as a result of cerebral hemorrhage.

She has been active professionally until her last days. She left a lot of unpublished notes. Her last finished work is a website dedicated to V. D. Belousov (see https://ru.wikipedia.org/wiki).

For more than fifty years Galina Belyavskaya worked in the Institute of Mathematics and Computer Science at the Academy of Sciences of Moldova. She started working there immediately after finishing her studies in Moldova State University

where she graduated with honors. Her PhD dissertation was prepared under the supervision of Valentin D Belousov.

Her scientific interests were connected with the theory of binary and n-ary quasigroups. List of publications and a brief overview of her results were presented in vol. 18 (2010), no. 2 of *Quasigroups and Related Systems*.

In the last five years Galina Belyavskaya studied various problems connected with the orthogonality of binary and n-ary quasigroups, especially paratrophy orthogonality, r-differentiable quasigroups and their transformations. She has also investigated parastrophically equivalent identities characterizing quasigroups isotopic to abelian groups.

In [77] she proved these two theorems.

Theorem 1. *A quasigroup $(Q, \cdot)$ is isotopic to a group if and only if the following identity is true*

$$R_a^{-1}(x \cdot L_b^{-1}y) \cdot z = x \cdot L_b^{-1}(R_a^{-1}y \cdot z).$$

Theorem 2. *A quasigroup $(Q, \cdot)$ is isotopic to an abelian group if and only if the following identity is true*

$$R_a^{-1}(y \cdot x) \cdot z = R_a^{-1}(y \cdot z) \cdot x.$$

Since M.M. Glukhov proved (unpublished result), that no balanced identities (in the Belousov's sense) exist with three variables that guarantee that a quasigroup is isotopic to an abelian group, the last result (three variables and one fixed element) seem to be the best possible.

Another well-known result proved by G. Belyavskaya (see *Quasigroups and Related Systems* vol. 1 (1994)) is the following theorem, in literature known as the Belyavskaya's Theorem.

Theorem 3. *A quasigroup is central (in the sense of Belyavskaya and Smith) if and only if it is a T-quasigroup.*

Galina put much of her attention to various applications of quasigroups to the construction of Latin squares (prolongation and contraction) and, in the last years, to the coding theory, in particular to sharing systems and check character systems.

Wieslaw A. Dudek
Victor A. Shcherbacov

Below we present the list of last publications of Galina B. Belyavskaya. It is a continuation of the list published in *Quasigroups and Related Systems* 18 (2010), 109 – 112.

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[70] *Conjugate-orthogonality and the complete multiplication group of a quasigroup*, (with A. Diordiev), Bul. Acad. Ştiinţe Republ. Mold. Mat. **1(59)** (2009), 22 – 30.

[71] *Secret-sharing schemes and orthogonal systems of k-ary operations*, Quasigroups Related Systems **17** (2009), 161 – 176.

[72] *Check character systems and totally conjugate orthogonal T-quasigroups*, Quasigroups Related Systems **18** (2010), 7 – 16.

[73] *Polynomial k-ary operations, matrices, and k-mappings*, J. Gen. Lie Theory Appl. **4** (2010), Article IDG100301.

[74] *Totally conjugate-orthogonal quasigroups and complete groups*, (with T. V. Popovich), J. Math. Sci. (N. Y.) **185** (2012), 184 – 191 (translation from Fundam. Prikl. Mat. **16** (2010), no. 8, 17 – 26).

[75] *Recursively r-differentiable quasigroups within S-systems and MDS-codes*, Quasigroups Related Systems **20** (2012), 157 – 168.

[76] *Conjugate sets of loops and quasigroups: DC-quasigroups*, (with T. Popovich), Bul. Acad. Ştiinţe Repub. Mold., ser. Math. **1(68)** (2012), 21 – 31.

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[80] *Parastrophically equivalent identities characterizing quasigroups isotopic to abelian groups*, Quasigroups Related Systems **22** (2014), 19 – 32.

[81] *Successively orthogonal systems of k-ary operations*, Quasigroups Related Systems **22** (2014), 165 – 178.

[82] *Near-totally conjugate orthogonal quasigroups*, (with T. Popovich), Bul. Acad. Ştiinţe Repub. Mold., ser. Math. **3(76)** (2014), 89 – 96.