Quasigroup functional equations and graphs

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A. Krapež and D. Živković proved that there is a bijective correspondence between classes of parastrophically equivalent parastrophically unicancellable generalized quadratic functional equations on quasigroups and 3-edge-connected cubic (multi)graphs. Let \((u_n)\) be the sequence of numbers of classes of such equations with \(n\) variables (i.e. the numbers of corresponding graphs with \(2(n - 1)\) vertices). Using a computer, the graphs are constructed with up to ten vertices and thus the results \(u_2 = 1, u_3 = 1, u_4 = 2, u_5 = 4\) obtained by other authors are verified and a new one that \(u_6 = 14\) is proved.

An outline is given for the method of finding a general solution of any parastrophically unicancellable generalized quadratic quasigroup functional equation.

The problem of F. M. Sokhats’kyi, concerning a property which distinguishes visually two parastrophically nonequivalent equations with four variables is solved. Another problem of finding a general formula for \((u_n)\) is posed.

This is report on a joint work with S. K. Simić and D. V. Tošić.