

1077-H1-850

**Serge C. Ballif\*** (ballif@math.psu.edu). *Orthogonal Graph Colorings.*

A *latin square* of order  $n$  is an  $n \times n$  array filled with  $n$  symbols such that each symbol occurs once in each row and column. Two latin squares are said to be *orthogonal* if, when they are superimposed, every ordered pair of symbols occurs exactly once. Latin squares are examples of a proper coloring of a graph. We define two  $n$ -colorings of a graph to be *orthogonal* if no ordered pair of colors occurs more than once when the two colorings of each vertex are listed as an ordered pair. We show that the usual bounds on the maximum size of a certain set of orthogonal latin structures such as latin squares, row latin squares, equi- $n$  squares, single diagonal latin squares, double diagonal latin squares, and sudoku squares are a special cases of bounds on orthogonal colorings of graphs. We also show that the problem of finding a transversal in a latin square of order  $n$  is equivalent to finding an  $n$ -clique in a particular graph. (Received September 23, 2011)