Mutually Orthogonal Factor-Pair Latin Squares

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A factor-pair latin square of order \( n \) is a latin square of order \( n \) such that for each pair of positive integers \( a, b \) with \( ab = n \), every symbol appears exactly once in each of the canonical \( a \times b \) regions that tile the square. Another way to say this is that a factor-pair latin square of order \( n \) is an \((a, b)\)-sudoku latin square for every pair of positive integers \( a, b \) satisfying \( ab = n \). We introduce a linear-algebraic method of producing factor-pair latin squares in prime-power orders and construct mutually orthogonal collections of such squares.

Keywords: factor-pair latin square, sudoku latin square, orthogonal latin squares