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On Franklin and Complete Magic Square Matrices,
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Abstract

We show that any complete (or most-perfect) magic square of order $8k$ ($k = 1, 2, \ldots$) can be transformed to a pandiagonal Franklin magic square by means of a special permutation matrix. However, not all pandiagonal Franklin magic squares can be obtained by this transformation for $k \geq 2$ and not all Franklin squares are pandiagonal. Since the number of complete magic squares of order $4k$ ($k \geq 2$) is known, our transformation gives a lower bound on the number of all order-$8k$ Franklin squares and pandiagonal ones.

General parameterizations, constructed here for Franklin and complete square matrices, lead to the fact that they are rank 3. Using this information, their spectra are studied. Then, odd matrix powers of pandiagonal Franklin squares are shown to be pandiagonal Franklin squares.