On the nonexistence of almost Moore digraphs of degree 4 and 5

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Abstract

Almost Moore digraphs of degree d and diameter k, in short (d,k)-digraphs, appear in the context of the degree/diameter problem as a class of extremal directed graphs.

Their adjacency matrix fulfills the matrix equation $I+A+A^2+\cdots+A^k = J+P$, where J denotes the all-one matrix and P is a permutation matrix associated with the automorphism r which assigns to each vertex its repeat.

So far, their existence has only been shown for $k = 2$. Their nonexistence has been proved for $k = 3$, 4, for $d = 2$, 3 when $k \geq 3$, and for $(4,k)$ and $(5,k)$-digraphs, $k \geq 3$, with self-repeats.

In this talk, we study the possible permutation cycle structures of the automorphism r for the $(4,k)$ and $(5,k)$-digraphs without self-repeats.