

Rank of adjacency matrices of directed (strongly) regular graphs

For a positive integer r we consider the set B_r of all values of $\frac{k}{n}$ for which there exists an $n \times n$ matrix with entries 0 and 1 such that each row and each column has exactly k 1's and the matrix has rank r . We prove that the set B_r is finite, for every r . If there exists a k -regular directed graph on n vertices such that its adjacency matrix has rank r then $\frac{k}{n} \in B_r$. We use this to exclude existence of directed strongly regular graphs for infinitely many feasible parameter sets.