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The degree/geodeticity problem for mixed graphs

The degree/girth problem asks for the smallest possible order of an undirected graph with given girth and minimum degree. In this talk we explore a new analogue of this problem for mixed graphs, i.e. graphs that contain both undirected edges and directed arcs. A mixed graph G is k -geodetic for some $k \geq 2$ if for any pair of vertices u, v of G there is at most one non-backtracking mixed path from u to v with length not exceeding k ; we ask for the order of the smallest k -geodetic mixed graph with given undirected and directed degrees. An extremal mixed graph for this problem is called a geodetic cage. We present new lower bounds on the order of k -geodetic mixed graphs, results on their regularity and constructions of geodetic cages.