A family of mixed dense graphs of diameter 2

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Abstract

In this paper we give a construction of mixed dense graphs of diameter 2, undirected degree q, directed degree $\frac{q-1}{2}$, and order $2q^2$, when q is an odd prime power. Since the Moore bound for a mixed Moore graph with these parameters is equal to $\frac{9q^2-4q+3}{4}$, the defect is $(\frac{q-2}{2})^2 - \frac{1}{4}$.

In particular for $q = 5$ we construct a mixed graph of order 50, undirected degree 5 and directed degree 2. Since Bosák proved (in 1979) that there does not exist a mixed Moore graph with these values of degree and diameter, and since it is easy to see that a mixed graph of the same parameter values and with one vertex less than the Moore bound also does not exist, it turns out that our graph is the largest possible.

Key words. Mixed Moore graphs, diameter, tournament.

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