Invited lecture

GRAPHS OF ORDER CLOSE TO MOORE BOUND: OVERVIEW AND OPEN PROBLEMS

Mirka Miller

The degree/diameter problem is to determine, for each d and k, the largest order $n_{d,k}$ of a graph (respectively, digraph) of maximum degree d (respectively, maximum out-degree d) and diameter at most k. It is easy to see that $n_{d,k} \leq M_{d,k}$, where $M_{d,k}$ is the Moore bound given by

$$M_{d,k} = 1 + d + d(d-1) + \cdots + d(d-1)^{k-1}$$

for undirected graphs, and

$$M_{d,k} = 1 + d + d^2 + \cdots + d^k$$

for directed graphs.

Graphs and digraphs of order equal to the Moore bound are called Moore graphs (respectively, Moore digraphs). Since there are very few Moore graphs and digraphs, it becomes interesting to study (d, k, δ)-graphs (respectively, (d, k, δ)-digraphs), that is, graphs (respectively, digraphs) of order δ less than the Moore bound.

In this talk we give an overview of the problem and present several interesting open problems in this area.