

1058-05-301

**Jacques A Verstraete\*** (jacques@ucsd.edu), 9500 Gilman Drive, La Jolla, CA 92037, and **Peter Keevash** and **Benny Sudakov**. *On a conjecture of Erdos and Simonovits*. Preliminary report.

Erdős and Simonovits conjectured that if  $H$  is any bipartite graph containing a cycle, then the maximum number of edges in an  $n$ -vertex bipartite graph containing no  $H$  is asymptotically the same as the maximum number of edges in an  $H$ -free  $n$ -vertex graph with no cycles of length at most  $k$ , for a sufficiently large integer  $k$ . They verified their conjecture for  $H = C_4$ .

We verify their conjecture for  $H = K_{3,3}$  and  $H = K_{2,t}$ , and in addition show that extremal  $C_4, C_k$ -free graphs are actually bipartite. Erdős also conjectured that extremal  $C_4, C_3$ -free graphs have asymptotically as many edges as extremal bipartite  $C_4$ -free graphs; we give evidence to the contrary by showing that extremal  $K_{2,3}, C_3$ -free graphs have substantially more edges than extremal  $K_{2,3}$ -free bipartite graphs. The proofs are a mix of probabilistic methods, and some algebra and number theory. (Received February 17, 2010)