1053-05-89   **Jan Hladky**, **Daniel Kral** and **Serguei Norine*** (snorin@math.princeton.edu), Department of Mathematics, Fine Hall, Washington Road, Princeton, NJ 08542. *Counting flags in triangle-free digraphs.*

Many results in asymptotic extremal combinatorics are obtained using just a handful of instruments, such as induction and Cauchy-Schwarz inequality. The ingenuity lies in combining these tools in just the right way. Recently, Razborov developed a flag calculus which captures many of the available techniques in pure form, and allows one, in particular, to computerize the search for the right combination.

In this talk we outline the general approach and describe its application to the conjecture that a digraph with minimum outdegree n/3 contains a directed triangle. This special case of the Caccetta-Haggkvist conjecture has been extensively investigated in the past. We show that a digraph with minimum outdegree a*n contains a directed triangle for a=0.3465. The proof builds on arguments used to establish previously known bounds, due to Shen from 1998 (a=0.3542) and Hamburger, Haxell and Kostochka from 2008 (a=0.3531). It consists of a combination of several computer generated inequalities. (Received August 21, 2009)