

Propp's Deterministic Realization of Random Walk

Date Tuesday, February, 5

Time 4 pm

Location 622 Mathematics

Abstract: On an infinite grid (Z and Z^2 being good examples) one may start with various numbers of chips at various positions and allow each chip to make an independent random walk. The P -machine, named for Jim Propp, simulates this with deterministic rules. In Z^2 , for example, forty chips at a position would be spread evenly amongst the neighbors. Propp's machine gives an ingenious rule when the number of chips are not divisible by four that manages to avoid drift so successfully that the number of chips at a given position after some time is extremely close to the expected number of such chips had a random walk been employed. The methodology involves a probabilistically motivated weight function and (especially for Z) some sweet elementary (but challenging) results about binomial coefficients.