1073-41-165   **Evans Harrell** (`harrell@math.gatech.edu`), Atlanta, GA 30332, and **Manwah Lilian Wong*** (`wong@math.gatech.edu`), 686 Cherry Street, School of Mathematics, Georgia Tech, Atlanta, GA 30332. *Dichotomy and behavior at infinity of solutions to difference equations.*

We study pairs of discrete Schrödinger equations whose potential functions differ by a small quantity. With simple assumptions on the growth rate of the solutions of the original system, we show that the perturbed system has a fundamental set of solutions with the same exponential behavior at infinity, and employ a variation-of-constants scheme to produce a convergent iteration for the solutions of the second equation in terms of those of the original one. We use the relations between the solution sets of the two equations to investigate exponential dichotomy of solutions and the structure of transfer matrices.

Later, we present a sharp discrete analogue of the Liouville-Green (WKB) transformation, making it possible to derive exponential behavior at infinity of a single difference equation, by explicitly constructing a comparison equation differing from it by a small perturbation.

We present several perspectives on the behavior of solutions at infinity. First we offer a geometric approach, to be followed by an asymptotic analytic approach of the recurrence matrices. (Received July 31, 2011)