

MATHEMATICS DEPARTMENT
North Carolina State University

DIFFERENTIAL EQUATIONS SEMINAR

Thursday, December 14, 2006
3:00 p.m. 330 Harrelson Hall

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“Singularity analysis for ultra-discrete equations and cellular automata”

Essentially, integrability is the field that studies nonlinear equations for which the dynamics can be determined for long periods of times. While the property of integrability for differential equations has been widely studied, the theory of integrable discrete systems is a relatively new field of research. This talk concerns the study of integrability detectors for discrete and ultra-discrete equations. For differential equations, the detection of integrability can often be achieved by means of an analysis of singularities of the solutions through the Painlevé test. In the discrete case, the singularity analysis is done with the so-called confinement property. More specifically, I will be considering the problem of understanding the notion of integrability in the context of *ultra-discrete equations* in which both the dependent and independent variables are discretized. These equations can be interpreted as generalizations of Cellular Automata (CA) for which the dependent variable can only take values 0 or 1. I will present a new method to identify integrable ultra-discrete equations which is the equivalent of the singularity confinement property for difference equations and the Painlevé property for differential equations. This criterion can be used to find new integrable ultra-discrete equations.

Please note the unusual day.

Graduate students are invited to attend.