

MATHEMATICS DEPARTMENT  
North Carolina State University

## DIFFERENTIAL EQUATIONS SEMINAR

Wednesday, March 19, 2003  
2:35 p.m. 330 Harrelson Hall

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### “Unidirectional versus bidirectional dispersal in discrete-time metapopulation models”

The effects of unidirectional and bidirectional dispersal on discrete-time metapopulation dynamics where the pre-dispersal local patch dynamics are of the same (compensatory or overcompensatory) or mixed (compensatory and overcompensatory) types will be discussed. Single-species metapopulation models behave as single-species single-patch models whenever all pre-dispersal local patch dynamics are compensatory and dispersal is bidirectional. However, the dynamics of the corresponding metapopulation model connected by unidirectional dispersal depends on the dispersal rates. The species goes extinct on at least one patch when the unidirectional dispersal rates are high, while it persists when the rates are low. Metapopulation models with “unstructured” overcompensatory pre-dispersal local dynamics can generate multiple attractors with fractal basin boundaries. Hanski *et al.* tested this prediction with extensive data on the butterfly *Melitaea cinxia*. In fragmented landscapes, multiple attractors impose a constraint on our ability to accurately predict the occurrence of species. Also, in mixed systems, dispersal is capable of altering the local habitat dynamics from compensatory to overcompensatory dynamics and vice versa.

**Graduate students are invited to attend.**

For questions, comments, and offers to talk, contact Steve Schecter, [schecter@math.ncsu.edu](mailto:schecter@math.ncsu.edu).

Please visit the DE Seminar web page at [www.math.ncsu.edu/seminars.html](http://www.math.ncsu.edu/seminars.html).