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MATHEMATICS COLLOQUIUM SERIES
UNIVERSITY OF CENTRAL FLORIDA



Bistable Waves in Discrete Inhomogeneous Media

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A crude model for electrical conduction in the nervous system is the spatially discrete Nagumo equation. Employing a piecewise linear approximation of the nonlinearity, one can derive exact solutions of this system such that a portion of the medium for conduction is deteriorated, characteristic of diseases that affect the nervous system. Using Jacobi operator theory and transform techniques, wave-like solutions are constructed for problems with essentially arbitrary inhomogeneous discrete diffusion, and these solutions directly correspond to monotone traveling wave solutions in the case of homogeneous diffusion. A thorough study of the steady state solutions provides necessary and sufficient conditions for traveling waves to fail to propagate due to inhomogeneities in the medium. Solutions with nonzero wave speed are also derived, and we learn how the wave speed and wave form are affected by the inhomogeneities. The case of one defect in the medium is considered as an example, and due to the complexity of the solutions, a numerical analysis becomes an essential part of this study.

DATE: Thursday, October 4, 2007
TIME: 11:30 am – 12:30 pm
PLACE: Math and Physics Building, Room 318

Refreshments served at 11:00 am in Room 318.