1035-35-261 **Jason Dean Lee*** (jl115@yahoo.com), Box 98965, Few FF 311, Duke University, Durham, NC 27708, and **John Neuberger**. *Existence of Asymptotic Solutions to Semilinear Partial Difference Equations on Graphs.*

This paper studies nonlinear partial difference equations on graphs. We seek solutions to the semilinear equation $-Lu + su + |u|u^{p-1} = 0$ where L is the Laplacian of a graph $G = (V, E)$. In particular we prove the existence of 3^n solutions when $s \to -\infty$ and $n = |V|$. In addition, we find their Morse indices and exact forms. In [1], the authors used the tGNGA method to produce bifurcation diagrams for several graphs; however, those diagrams are not complete. This study complements [1] by using the asymptotic solutions to construct a complete bifurcation diagram. A comparison of bifurcation diagrams between the two techniques will be shown.

1. Neuberger, John M. and Sieben, Nándor and Swift, James W., *Symmetry and Automated Branch Following for a Semilinear Elliptic PDE on a Fractal Region, SIAM J. of Dynam. Sys. 5 (2006), no. 3, 476-507 (electronic).* *(Received August 27, 2007)*