1035-35-261 Jason Dean Lee* (j1115@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 
\[-Lu + su + |u|^{p-1} = 0\] 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.