

Slippery Rock University
Department of Mathematics and Statistics

Presents

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**“On digraphs with polygonal restricted
numerical range”**

Abstract

Spectral graph theory has a long and successful history of characterizing graphs. However, there has been far less success in the study of the spectra of directed graphs, which is mainly due to the asymmetry of the associated matrices. In 2020, Cameron et al. introduced the concept of the restricted numerical range of a digraph, which can be used to characterize digraphs and study their algebraic connectivity. The authors were able to characterize digraphs whose restricted numerical range was equal to a single point or a horizontal or vertical line segment. In this talk, we investigate digraphs whose restricted numerical range is polygonal, i.e., a convex polygon in the complex plane, which includes the previously mentioned degenerate polygons as a special case. In particular, we provide computational methods for identifying these polygonal digraphs, and show that these digraphs can be broken into three disjoint classes: normal, restricted-normal, and pseudo-normal digraphs. Each class is closed under the graph complement, and we prove sufficient conditions for the structure of digraphs in each class. Finally, we prove that the sufficient conditions for restricted-normal digraphs are also necessary when the digraph's order is square-free.

Friday, April 9th

3:00 p.m.

<https://sru.zoom.us/j/98352961875>

Students are welcome!