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K. Daly, C. Gavin, G. Montes de Oca, D. Ochoa, E. Stanhope* (stanhope@lclark.edu)
and **S. Stewart**. *Orbigraphs: a directed graph analog of a Riemannian orbifold*.

A Riemannian orbifold is a mildly singular generalization of a Riemannian manifold that is locally modeled on R^n modulo the action of a finite group. Orbifolds have proven interesting in a variety of settings. Spectral geometers have examined the link between the Laplace spectrum of an orbifold and the singularities of the orbifold. One open question in this field is whether or not a singular orbifold and a manifold can be Laplace isospectral. Motivated by the connection between spectral geometry and spectral graph theory, we define a directed graph analog of an orbifold called an orbigraph. We obtain results about the relationship between an orbigraph and the spectrum of its adjacency matrix. We prove that the number of singular vertices present in an orbigraph is bounded above and below by spectrally determined quantities, and show that an orbigraph with a singular point and a regular graph cannot be cospectral. We also provide a lower bound on the Cheeger constant of an orbigraph. (Received September 17, 2019)