

## **Matrices and Kirchhoff Graphs, A Rank 2, Nullity 2 Construction**

Judi J. McDonald, Washington State University, Joseph D. Fehribach\*, WPI

Kirchhoff graphs are vector graphs which satisfy the Kirchhoff laws and can be used as circuit diagrams for chemical and other reaction networks. The construction of Kirchhoff graphs associated with a given matrix can be a difficult problem, and in general it is still an open question whether or not there exists a Kirchhoff graph for any matrix with rational entries. Here we present a construction for Kirchhoff graphs for rank 2, nullity 2 matrices over the rationals, and discuss the general construction problem.

Keywords: Kirchhoff graphs, reaction networks