Zero Forcing:
A Simple Game with Deep Applications

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Abstract: Zero forcing is a coloring game played on a simple graph. It is simple enough to teach to children, yet it has deep applications in linear algebra, electrical engineering and control of quantum systems. Zero forcing was introduced to the linear algebra community as a combinatorial upper bound for the maximum nullity of the family of real symmetric matrices defined by a graph. Since its introduction, multiple variations of zero forcing have been created that are connected to other graph parameters and other sets of matrices associated to a graph. It is also connected to the graph-theoretic study of power domination, which comes from the engineering challenge of efficiently monitoring an electric power grid. In this talk, I will explain how zero forcing is played on a graph, and explain how it is connected to linear algebra and power domination. This introduction will be accessible to undergraduates who have had a course in linear algebra. Through my story of how I became interested in zero forcing, audience member may glimpse their own potential to use the connecting power of mathematics.

About the speaker: Dr. Flagg has a B. S. in Chemical Engineering from Rice University, a M. S. in Chemical Engineering from the California Institute of Technology and a Ph. D. in Mathematics from the University of Houston in 2006. She worked as a lecturer at UH from 2006-2013. In 2013, Dr. Flagg joined the faculty of the Department of Mathematics, Computer Science and Cooperative Engineering at the University of St. Thomas as a tenure-track assistant professor. Dr. Flagg is currently preparing to submit her tenure portfolio in November of 2017. Her story is one of experience as a teacher, excitement for mathematical and enthusiastic discovery in spite of life’s challenges.