1139-05-496 **Franklin H. J. Kenter*** (kenter@usna.edu) and **Jephian C.-H. Lin**. *On the error of a priori sampling: zero forcing sets and propagation time.*

Zero forcing is an iterative process on a graph used to bound the maximum nullity. The process begins with select vertices colored; the remaining vertices can become colored under a color change rule. The goal is to find a minimum set of vertices such that after iteratively applying the rule, all of the vertices become colored. Of particular interest is the propagation time, the number of steps the rule must be applied in order to color all the vertices of a graph.

We give a purely linear algebraic interpretation of zero forcing: Find a set of vertices S such that for any weighted adjacency matrix $\mathbf{A}$, whenever $\mathbf{Ax} = \mathbf{0}$, the entirety of of $\mathbf{x}$ can be recovered using only $\mathbf{x}_S$, the entries corresponding to S. The key here is that S must be chosen before $\mathbf{A}$. In this light, we are able to give a linear algebraic interpretation of the propagation time: Any error in $\mathbf{x}_S$ effects the error of $\mathbf{x}$ exponentially in the propagation time. This error can be quantitatively measured using newly defined parameters. In this sense, the quality of two zero forcing sets can objectively be compared even if the sets are the same size and their propagation time is the same. Examples and constructions are given. (Received February 19, 2018)