Reconfiguration for failed zero forcing and forts

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Reconfiguration is the process of transforming one solution to a problem into a different solution through a series of incremental steps, while maintaining the property of being a solution at each step. The zero forcing problem is to find the minimum cardinality of an initial set of vertices of the graph that will observe the whole graph according to the zero forcing color change rule. A set of vertices is a failed zero forcing set if it does not result in the whole graph observed. A fort is a blocking set of vertices for zero forcing, and the connection is that the complement of a failed zero forcing set contains a fort. We study the TAR (token addition and removal) reconfiguration graph of failed zero forcing sets. Two sets are connected by an edge if one may be obtained from the other by adding or removing a single vertex. Complements of maximal failed zero forcing sets are minimal forts, so in a sense the failed zero forcing TAR graph can be viewed as a graph of supersets of forts. We use the universal results on X-set TAR reconfiguration to show that the TAR reconfiguration graph for failed zero forcing may be used to study disjoint forts.

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