Title: Inverse monoids of partial automorphisms of graphs.

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Abstract:

The problem of determining the full automorphism group of a combinatorial structure (for example a graph) is one of the well-known hard problems. The focus of our project is on an extension of the automorphism group problem to that of inverse semigroup problem. The full inverse semigroup of partial automorphisms of a combinatorial structure is a much richer algebraical structure that contains more detailed local information about the underlying object. The goal is to apply the algebraic methods of partial permutation semigroup theory to the class of combinatorial structures that admit none or only very few automorphisms and typically resist the use of methods from permutation group theory.

The presentation is based on joint work in progress with Maria Szendrei, Nora Szakacs, and Robert Jajcay.

In the presentation, I will mention a couple of open problems from Graph Theory to motivate our interest in partial automorphisms and monoids of partial automorphisms of graphs. I will discuss two older papers by Margolis and Dinitz on Translational Hulls and Block Designs that represent a different approach to the same question: a generalization of automorphisms and studying local properties of combinatorial structures. I will also survey just recently published paper by Chih and Plessas on Graphs and their associated inverse semigroups (Discrete Mathematics, 2017). Finally, I will report on our work: using Green's relations, partial order for $\mathcal{D}$-classes, and the Munn representation of inverse semigroups, I will give an algebraic characterization of inverse monoids of partial automorphims of graphs.