Meeting: 1007, Santa Barbara, California, SS 10A, Special Session on Complexity of Computation and Algorithms

1007-68-46 **Marcus Schaefer*** (mschaefer@cs.depaul.edu), 243 South Wabash, Ste 401, Chicago, IL 60604, and **Eric Sedgwick** and **Daniel Stefankovic**. *The Complexity of String Graphs.*

String graphs are the intersection graphs of Jordan arcs in the plane: Each arc is represented by a vertex and there is an edge between two vertices if the corresponding arcs intersect. Recognizing whether a graph is a string graph is a problem which arose in the 1960s in the context of genetic sequencing (Benzer, 1959) and circuit layout (Sinden, 1966). Decidability of the problem was settled only forty years later in 2001–independently by Pach and Tóth, and Schaefer and Štefankovič.

These papers give a NEXP-algorithm for recognizing string graphs, since the drawing of a string graph can be exponential in the size of the graph. By developing algorithms for exponentially succinct representations of curves in surfaces, we can show that string graphs can be recognized in NP, which matches the NP-hardness proof by Kratochvíl from 1991. As a result, several problem which were not known to be decidable—such as drawability of Euler diagrams, topological inference, and graph realizability—are now known to be in NP.

We continue the study of algorithms for succinctly represented curves on surfaces, showing how to compute algebraic and geometric intersection numbers. This work adds a new point of view in computational topology and topological graph theory. (Received January 05, 2005)