Scientific report of Sergio Cabello

Name:	Sergio Cabello
Supervisor(s):	Günter Rote
Field of Research:	Computational Geometry
Topic:	Embeddability of graphs
PhD Fellow	at the program from April 2003 to June 2003

Field of Research and Results

A well-studied problem in rigidity theory consists of deciding if a graph can be embedded in $\mathbb{R}^d$ when the edge lenghts are prespecified. Together with Erik Demaine and Günter Rote, we have considered the problem in the plane, but with the additional constraint that the embedding should be planar. We have shown that even for 3-connected planar graphs, for which all the embeddings are topologically equivalent, the decision problem is NP-hard. On the other hand, we have considered a more restricted class of 3-connected graphs for which the problem is solvable in a real RAM model. This gives a fair division between for which graphs it can be done in polynomial time and for which it is NP-hard. This topic is specially related to my thesis topic, and we have written a paper which has been submitted.

Together with Christian Knauer, we have discussed the maximization of the overlap on sets of disks, and a few more problems. Together with Ares Ribó, we have discussed problems related to her research on self-touching linkages.

Activities

- Attendance to the course Applied Network Optimization, given by Rolf Möhring and Martin Skutella, at TU Berlin.
- Attendance to the course Geometric Graphs, given by Janos Pach, at UPC (Barcelona).
- Attendance to the Lectures and Colloquium of the CGC program (once a week).
- Attendance to the noon-seminars at FU-I. Informatik (twice a week).
- Two talks at the noon-seminar at FU-I. Informatik.

- One talk at the Colloquium of the CGC program ("Testing homoptopy for paths in the plane").

Preview

Possibly, the results with E. Demaine and G. Rote will be polished into a journal version of the current paper. The work with C. Knauer and A. Ribo is in a first stage, and we will keep contact through e-mail to finish it.

Back in Utrecht, I have to start writing my PhD thesis, and depending on the available time, I will participate at the CGC Workshop to be celebrated by the end of September in Neustrelitz.