Guest Editor's Foreword

This special issue consists of seven invited articles based on papers presented at the Eighth Annual Symposium on Computational Geometry, held from June 10–12, 1992 in Berlin. The papers were selected to illustrate the current state of the art in Discrete and Computational Geometry. All seven papers were subjected to the usual refereeing process of this journal.

The first article, by Noga Alon and Yossi Azar, considers the problem of constructing an on-line Steiner tree in the Euclidean plane. They give an almost tight lower bound on the competitive ratio of any on-line algorithm for this problem. In the second article, Alexander Barvinok considers the classical geometric problems of computing the volume and counting the integral points of a convex polytope. He gives some important special cases where these problems can be solved in polynomial time. Hervé Brönnimann, Bernard Chazelle, and János Pach, in the third article, give the first nontrivial lower bound for half-space range searching in high dimensions. The lower bound determined is very close to the upper bound for the same problem obtained by Jiří Matoušek, the author of the fourth article of this issue. In this paper, Matoušek presents an improved space/query time tradeoff for the general simplex range-searching problem, which matches the best-known lower bound up to small polylogarithmic factor. He also gives an improved algorithm for detecting a point line incidence in the plane. In the next article, Bernard Chazelle, Herbert Edelsbrunner, Leo Guibas, and Micha Sharir apply the parametric searching technique to well-known geometric problems. Results presented include improved algorithms for determining the diameter and width of a point set in space, and for determining the closest pair in a set of n lines in space. The sixth paper concerns Delaunay triangulations and is authored by Herbert Edelsbrunner and Tiow Seng Tan. They show that for every graph with n vertices and m edges there is a completion of a Delaunay triangulation of $O(m^2n)$ points such that each edge of the graph is the union of some edges of the triangulation. The final article in the issue concerns membership and ray shooting in convex polytopes, and is by Jiří Matoušek and Otfried Schwarzkopf. They show that some specific data structures for the membership problem can be

used for ray shooting without the use of parametric search. They also give an improved static solution for the membership problem.

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