ROCKY MOUNTAIN
JOURNAL OF MATHEMATICS
Volume 14, Number 1, Winter 1984

SURFACES

Preface. A symposium on surfaces was held as part of the Society for Industrial and Applied Mathematics meeting at Stanford University in July, 1982. The need for such a surfaces symposium arises for various reasons including the following:

1. the problems involved in constructing truly multi-dimensional surfaces are now becoming well-defined, and

2. solutions for some of these problems are being found.

This maturing of the field is exemplified by other conferences, e.g., the April, 1982 Oberwolfach conference published as *Surfaces in Computer Aided Geometric Design*, edited by R. E. Barnhill and W. Boehm, North-Holland Publishing Company.

The SIAM surfaces symposium was encouraged by Gene Golub (partly by his earlier surfaces day at Standford). From the outset, we thought that the value of the sessions would be enhanced by the publication of refereed proceedings. Tom Sherman encouraged this effort and the result is the proceedings which follow. We have received a good deal of help with the manuscripts, both from the authors and the referees. In addition, Bill Scott, the Managing Editor of the Rocky Mountain Journal of Mathematics, has been very helpful. Sylvia Morris expertly typed about half the volume. We are indebted to everyone mentioned above, as well as to our colleagues who have helped us with friendly interactions.

Introduction to surfaces. Surfaces arise in many parts of science and engineering. In most cases surface data available to the scientist are arbitrarily located so that tensor product methods appropriate for simpler data with rectilinear grids are not applicable. The papers in this volume address this more robust problem of arbitrarily spaced information with truly multivariate surfaces.

This symposium, like most dealing with complex applied problems, includes a wide variety of topics. This is a large field and all topics despite their importance are not equally represented. Most of the papers deal with three-dimensional surfaces, but several concern new extensions to four-dimensional surfaces. In this field, as in all science there are a number of recurring dualities or alternative ways of looking at the same topic. Phil Davis has pointed out the complementarity of interpolation and approximation. A similar complementarity may be seen in representation and design of surfaces. Interpolation methods are frequently used for approximation methods as, for example, in the Finite Element Method.