

Special Section on Difference Equations

Foreword

The swift and dramatic rise of the computer as a new mathematical aid in every sort of human endeavor has, as one might expect, been reflected in mathematics itself. The field of numerical analysis, once a rather narrow province, has become a major region of mathematical activity. One of the most prophetically stimulating developments in numerical analysis occurred some years before the appearance of electronic digital computers. This was the paper "On the Partial Difference Equations of Mathematical Physics" by Richard Courant, Hans Lewy, and Kurt Friedrichs, published in *Mathematische Annalen* in 1928. This paper has formed the basis of modern investigations into the numerical analysis of partial differential equations. The ideas exposed still prevail.

Professor Courant, his colleagues and his students have continued to help provide the numerical theory that digital computation requires. For a number of years, Professor Courant has been closely associated with mathematical developments in IBM and has played an important role in stimulating interaction between the mathematics community and workers in computer development.

We have thought it appropriate, in recognition of his continuous role in numerical analysis and his close ties with IBM, to dedicate the three following papers to Professor Courant. We have asked three mathematicians prominent in the field of the numerical analysis of partial differential equations to survey the developments since the 1928 publication. Professors Lax, Parter, and Widlund have all, during the course of their careers, come under the direct or indirect influence of Professor Courant.

We have also decided to reprint an English translation of the original *Mathematische Annalen* paper because English versions have had a somewhat limited distribution. The one presented here was prepared by Professor Phyllis Fox, and we are greatly indebted to her and to the U. S. Atomic Energy Commission for its use here.

In addition we are most grateful to Drs. Hirsh Cohen, Herman H. Goldstine, and Ralph E. Gomory for their help in planning this group of papers and particularly to Dr. Willard Miranker for his efforts in acquiring the appropriate manuscripts.