Mathematics of Computation. But this does not diminish the relevance of this monograph to *numerical* functional analysis. One is reminded of a statement by the late A. S. Householder, in his review of the book by Collatz [1] in *Mathematical Reviews* (MR **29**, #2931): "It seems strange that this book should be the first of its kind, since it hardly needs to be said that 'numerical mathematics' must draw heavily from functional analysis." It has been thirty years since Householder's review. Time has only reinforced the relation between these two fields, which must continue to enrich each other by drawing heavily from each other.

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1. L. Collatz, *Funktionalanalysis und numerische Mathematik*, Springer-Verlag, Berlin, 1964; English translation, *Functional analysis and numerical mathematics*, Academic Press, New York, 1966.
2. M. Z. Nashed, Bull. Amer. Math. Soc. **82** (1976), 825–834.
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5. W. V. Petryshyn, *Projection methods in nonlinear functional analysis*, J. Math. Mech. **17** (1967), 352–372.
6. ——, *Remarks on the approximation-solvability of nonlinear functional equations*, Arch. Rational Mech. Anal. **26** (1967), 43–49.
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4[65-06, 65C20, 76-06, 76C05].—J. T. BEALE, G.-H. COTTET & S. HUBERSON (Editors), *Vortex Flows and Related Numerical Methods*, NATO ASI Series, Series C: Mathematical and Physical Sciences, Vol. 395, Kluwer, Dordrecht, 1993, viii + 387 pp., $24\frac{1}{2}$ cm. Price $155.00/Dfl.265.00.

This book consists of a series of twenty-seven papers based on lectures given at the NATO Advanced Research Workshop held in Grenoble, France, in June 1992. A typical conference proceedings volume, it provides an overview of the most current research in the study of vortex flows. The emphasis is on both up-to-date mathematical models as well as numerical methods used to study the particular features of these flows.

The articles are not meant to provide an introduction to the specific subjects, but are rather a summary of recent results in the area. Extensive references serve as a useful guide to related literature. Intended readers are researchers and graduate students with interests in computational fluid dynamics, numerical analysis or applied mathematics in general.

The papers in the first part of the volume cover most recent developments in mathematical and numerical modeling for incompressible vortex flows. The second part treats mainly vorticity generation problems, related boundary layer and wake models in two dimensions. The third part concentrates on vortex methods, hybrid finite difference vortex methods, contour dynamics and numerical experiments performed using these methods. Topics in the fourth part revolve around three-dimensional computations for incompressible flows: vortex rings, vortex sheets, dynamics of vortex tubes in turbulence are some of the subjects addressed here. Finally, the fifth part consists of four articles which focus on the numerical simulation of reacting and compressible flows.

The titles of the papers are as follows: 1. Local spectral analysis of turbulent flows using wavelet transforms; 2. Operator splitting for Navier-Stokes and Chorin-Marsden product formula; 3. Velicity methods: Lagrangian numerical methods which preserve the Hamiltonian structure of incompressible flows; 4. Statistical mechanics for the vortex model; 5. On singular solutions of the Vlasov-Poisson equations; 6. Point vortices and localization in Euler flows; 7. Turbulence modeling for incompressible vortex flow; 8. Investigation of the use of the Prandtl/Navier-Stokes equation procedures for two-dimensional incompressible flows; 9. Vorticity boundary conditions for the Navier-Stokes equation in velocity-vorticity formulation; 10. A coupled potential-boundary layer calculation method for unsteady flows around airfoils; 11. Viscous simulation of wake patterns; 12. The vorton methods; 13. Numerical simulation of unsteady flows behind cylindrical structures using a finite difference-particle superposition algorithm; 14. Moment accelerated contour surgery; 15. Direct numerical simulations using vortex methods; 16. Numerical study of the motion and deformation of two-dimensional bubbles by a vortex method; 17. A hybrid vortex method with deterministic diffusion; 18. A slightly diffusive contour dynamics; 19. Model coherent structure dynamics: vortex reconnection, core dynamics and interaction with turbulence; 20. The nonlinear dynamics of a jet shear layer with swirl; 21. Dynamics of vortex tubes in three-dimensional turbulence; 22. Numerical simulation of axisymmetric vortex sheet roll-up; 23. Free vortex rings, analogies and differences between vorticity and a passive scalar; 24. Turbulent eddy structures, combustion and chemical reactions; 25. Vortex generation and evolution in numerical simulation of transitional shear flows; 26. Stability analysis of differentially-heated asymmetric vorticity layers; 27. A particle in cell method for the 2-D compressible Euler equations.

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5[90C05, 90C06].—Ami Arbel, *Exploring Interior-Point Linear Programming: Algorithms and Software*, Foundations of Computing Series, The MIT Press, Cambridge, MA, 1993, xxiv + 211 pp., 23 cm. Price: Softcover (includes floppy disk with DOS program) $35.00.

Interior-point methods have proved to be powerful and elegant techniques for solving linear programming problems, and their study is now being incorporated into introductory courses on linear programming. It is now possible to present some of the fundamental ideas concisely and with simple mathematical tools. Nevertheless, students often develop the idea that codes implementing interior-point methods need to be highly sophisticated, or else they will fail owing to ill-conditioning, or may behave poorly. This book makes a splendid contribution