colloidal particle in an electrolyte; the local charge distributions and the free energy are also given. The electrolyte is characterized by the following parameters: ϵ, the dielectric constant; z_+, the valence of the positive ions; z_-, the valence of the negative ions; n_+, the concentration of positive ions far from the particle; n_-, the concentration of negative ions far from the particle; T, the absolute temperature.

For the numerical computations reduced variables are introduced. In these new variables the Poisson-Boltzmann equation becomes

$$\frac{d^2y}{dx^2} = \frac{\exp(z_-y) - \exp(-z_+y)}{2z_-x^4}$$

and the boundary conditions are $y = 0$ at $x = 0$ and $y = y_0$ at $x = x_0$, where y is the reduced potential and x is the new independent variable. The local charge distributions and the free energy are represented by $I_+(x)$, $I_-(x)$, and $F(x)$ where:

$$I_+(x) = x^2 \int_0^x \frac{1 - e^{-z_+y}}{2z_-\tau^4}\, d\tau;$$

$$I_-(x) = x^2 \int_0^x \frac{e^{z_-y} - 1}{2z_-\tau^4}\, d\tau;$$

$$F(x) = x^2 \int_0^x \left[\frac{1}{2}\left(\frac{dy}{d\tau}\right)^2 + \frac{z_+(e^{z_-y} - 1) - z_-(1 - e^{-z_+y})}{2z_+z_-^2\tau^4}\right] d\tau.$$

The quantities x, $y(x)$, $I_+(x)$, $I_-(x)$, and $F(x)$ are tabulated for a variety of values of z_+, z_- (1,1; 2,1; 3,1; 1,2; 1,3) and of $1/x_0$ (from 0.1 to 20 in varying steps) and of y_0 (from 0.5 to 16 in varying steps). The values of y, I_+, I_- and F are said to be accurate to four significant figures, except for a few cases where there is an error in the third figure.

The tables include a forty-page discussion of the equation to be solved, the numerical methods and the results.

These computations are said to be more extensive and more accurate than similar computations performed by N. E. Hoskin, *Trans. Faraday Soc.*, v. 49, 1953, p. 147.

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91[H, X].—LOTHAR COLLATZ, *The Numerical Treatment of Differential Equations*, Third Edition, Translated by P. G. Williams from a supplemented version of the second German edition, Springer-Verlag, Berlin, 1960, xv + 568 p., 24 cm. Price DM 98.

The translation of Professor Collatz's book into English will be welcomed by all those people who are in any way concerned with the numerical solution of differential equations. No other single book on this subject contains such a vast amount of material. The following list of the chapter headings gives some idea of the range of topics covered.

I. Mathematical Preliminaries and Some General Principles

II. Initial-Value Problems in Ordinary Differential Equations
III. Boundary-Value Problems in Ordinary Differential Equations
IV. Initial and Initial-Boundary-Value Problems in Partial Differential Equations
V. Boundary-Value Problems in Partial Differential Equations
VI. Integral and Functional Equations

The appendix contains a number of tables giving the various numerical methods in handy tabular form for both ordinary and partial differential equations.

This book is a translation of the second German edition with some differences. As the author states, "It differs in detail from the second edition in that throughout the book a large number of minor improvements, alterations and additions have been made, and numerous further references to the literature included; also new worked examples have been incorporated."

The book is large but by no means covers the subject completely, as the author is careful to point out in the preface. Professor Collatz also disclaims any attempt to make general critical comparisons of the various methods presented. This is to be regretted, since it decreases the value of the book to those persons who would be most likely to refer to it, namely the neophytes in this numerical field. Along this same line of criticism there is no mention made of the use of computers, either analog or digital, for the numerical solution of differential equations. This gives a new book a distinctly old-fashioned flavor. A specific example may be cited to illustrate the criticism. In Chapter II the author states that the Runge-Kutta and Adams methods are stable with respect to small random errors. However, he does not warn the reader as to which of the well-known methods are unstable. Thus, the uninitiated might be tempted to code an unstable method as a subroutine for a computer.

On the positive side, the book can be recommended for its vast coverage, its many worked examples, and its close attention to error estimates. The translation is smooth and the printing is excellent.

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92[H, X].—L. DERWIDUÉ, *Introduction à l'Algèbre Supérieure et au Calcul Numérique Algébrique*, Masson et Cie, Paris, 1957, 432 p., 25 cm. Price 6000 fr.

This author presents an interesting combination of pure theory and computational methods for linear and non-linear algebra—that is, linear equations, eigenvalues, roots of algebraic equations, etc. He concludes with an introduction to abstract algebra.

The numerical methods are developed for use with desk computers and are amply illustrated throughout the text. A listing of the chapter headings will indicate the scope of the work.

I. Mécanisation du calcul algébrique. Nombres complexes.
II. Les déterminants et les systèmes d'équations linéaires.
III. Théorie générale des polynômes et des fractions d'une indéterminée.
IV. Elimination et systèmes d'équations algébriques.
V. Résolution numérique des équations.