247. A. C. Sugar: *An elementary exposition of the relaxation method.*

This is, as labeled, an elementary exposition. The purpose of this paper is to exhibit the simplicity and power of the relaxation method, to complete and explain previous sketchy or obscure discussions of this subject. It is also intended to direct attention to some mathematical, physical, and philosophical questions that may be raised in connection with this method. (Received May 29, 1946.)

248. A. C. Sugar: *On the relaxation-matrix method of solving boundary value problems.*

This is a continuation of the study of the use of relaxation and iterative methods of inverting the matrices of the systems of equations obtained from boundary value problems by finite difference methods. In a previous paper, entitled *The use of invariant inverted matrices for the approximate solution of classes of boundary value problems,* the writer inverted matrices by relaxation methods and applied them to the solution of simple illustrative problems. In the present paper, this work is continued and applications are made to some of the typical boundary value problems of mechanics. (Received May 29, 1946.)

249. A. C. Sugar: *The use of invariant inverted matrices for the simultaneous approximate solution of classes of boundary value problems.* Preliminary report.

The writer considers the simultaneous approximate solution of classes of boundary value problems. Each class consists of the totality of boundary value problems having the same differential equation and the same boundary but different boundary conditions. Using finite difference methods it is shown that the derived system of equations will have an inverse matrix M, invariant over the class, which may be determined by relaxation methods. A solution of any member of the class may then be obtained by multiplying M by a column matrix defined by the corresponding boundary values. This paper will be primarily concerned with the application of this method to Laplace's equation. The effect of modifications of the boundary on M will be considered. This technique may be applied to many other types of differential equations. This is true, in particular, of Poisson's equation and of nonlinear equations containing the Laplace operator, since, as far as the algebraic treatment is concerned, these two types may be treated as Laplace equations with altered boundary conditions. Finally, the possibility of considering M as an approximation or an analogue of Green's function is studied. (Received April 16, 1946.)

Geometry

250. L. M. Blumenthal: *Superposability in elliptic spaces.*

Two subsets of a metric space M are *superposable* provided a congruent (that is, one-to-one, distance-preserving) mapping of M onto itself exists which maps one subset onto the other. In spaces most studied (euclidean, spherical, and so on) congruence of subsets implies that they are superposable, but this is not the case in elliptic spaces $E_{n,r}$ for $n>1$, and hence this property cannot be expressed in metric terms alone. This paper shows that congruent but not superposable subsets of $E_{n,r}$ fall into two classes (a) congruent subsets contained irreducibly in different dimensional subspaces and (b) those contained irreducibly in subspaces of the same dimension. By means of