"weighted" (belastete) orthogonality: $V_1(1)V_2(1)+\int_0^1 V_1(x)V_2(x)dx=0$. Theorems analogous to the usual ones are indicated.

The bibliography in the appendix should not be overlooked. While it lays no claim to completeness, it is particularly valuable in the field of the applications. Its extent has been nearly doubled in the new edition.

The additions have materially enhanced the value of the book, and the chapter on the theory of the symmetric kernel has helped to meet Hurwitz' criticism as to the confusing effect of frequent alternation of general theory and particular examples. But only partially so, for as a rule several pages must be read before one can ascertain the precise conditions for the validity of a theorem, and in some cases the reader must bring an independent judgement to bear on his quest (e. g. on p. 38, line 19; the functions must be continuous and have *continuous* derivatives of first and second orders as well as piecewise continuous derivatives of third and fourth orders if the reasoning indicated is to establish the stated results). The style is further complicated by the habit of deferring the statement of a theorem until after its proof. Thus is imposed upon the attention of the reader the double task of following the reasoning and endeavoring to determine its import. Nor is much help given him by preliminary elucidation as to the general goal or the salient features of the discussion to follow.

The lacuna pointed out by Hurwitz in the proof of the theorem that to a solution of a homogeneous integral equation there always corresponds a solution of the associated equation has been allowed to stand; the section has been reprinted with such fidelity that a confusing typographical error recurs (p. 249, line 16: "Gleichung (7)" should read "Gleichung (3)").

The preparation requisite for a profitable reading of this book includes a knowledge of the rudiments of integral equations, some acquaintance with differential equations, with the theory of functions, and with physics; above all some mathematical maturity is essential. For one so equipped it is highly interesting and suggestive. Certainly no one who has to lecture on integral equations can afford to be unacquainted with its contents.

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Introduction à la Théorie de la Relativité, Calcul Différentiel Absolu, et Géométrie. By H. Galbrun. Paris, Gauthier-Villars et Cie., 1923. x+457 pp.

This work is a rather complete treatment of the mathematics of the relativity theory. Three chapters, about 100 pages, are devoted to a systematic and detailed exposition of the method of the absolute differential calculus. The differential geometry of n-dimensional space is allotted four chapters including slightly over 150 pages. The remainder of the book is devoted to mechanical and electromagnetic theories, first from the older point of view, then from the standpoint of special relativity. Strangely enough the general theory of relativity is not specifically treated. So we miss the usual denouement of books on relativity—the three crucial tests.

In the very beginning of the exposition of the absolute calculus is an error which should be noted. The author, in his definition of invariant and co- and contravariant systems, has confused the term invariant as used by Ricci with the ordinary sense in which the word is used. With Ricci it is equivalent to the expression "a function which transforms by invariance", which is merely a statement of the transformations by which we are to transform the function and does not imply invariance under the transformations. In a remark following the definitions he seems to imply that for an ensemble of transformations forming a group this preservation of functional form, which his definitions demand in excess of Ricci's, is automatically taken care of and so need not be explicitly stated. As a matter of fact it would seem that in general functions satisfying his definitions do not exist. The upshot of the matter is that with this remark he throws overboard his definitions without once using them, and uses the standard definitions of Ricci throughout the book.

Several things unite to make this treatment perhaps the most valuable book of reference on the absolute calculus that has yet appeared. Very few things in development or proofs are left to the reader's imagination. The author even scorns to forget his signs of summation, as do most of the present generation. Covariant and contravariant derivatives are indicated by Δ's with subscripts and superscripts, and so are distinguishable from other tensors of the same order.

In the part of the book devoted to n-dimensional geometry we again find a valuable work for reference. The notion of a vector, with its co- and contravariant components, is basic in his treatment. Then the notion of parallel displacement of a vector, fundamental to the Weyl geometry, is twice explained in great detail, once for euclidian space, and later for the non-euclidian. Geodesics and curvature are defined in terms of parallel displacement as well as in the usual manner. Thus we are thoroughly prepared for the chapter on Weyl geometry which completes the geometrical part of the book.

Chapter IX is entitled Galilean spaces in rational mechanics and electromagnetic theory, and deals with the older theory but uses the tools of the new, and prepares for Chapter X on Special Relativity, and Chapter XI on the Memoir of Minkowski. Finally come some remarks on the kinematics of relativity, which help much towards clarity of thinking about the conceptions which serve to connect the mathematics and the physics of the relativity theory.

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