THE PRINCETON COLLOQUIUM.

THE Sixth Colloquium of the American Mathematical Society was held, at the close of the sixteenth summer meeting, at Princeton University, Princeton, N. J., opening on Wednesday morning, September 15, 1909, and extending until the following Friday.* At the April meeting, 1908, the Council appointed a committee consisting of Professors H. B. Fine, W. F. Osgood, T. F. Holgate and F. N. Cole to arrange for the colloquium. A preliminary circular announcing the general features was issued in May of 1909. The colloquium opened on Wednesday morning, September 15, 1909, in the lecture room of McCosh Hall, Princeton University, the following 28 persons being in attendance:

Professor G. D. Birkhoff, Professor G. A. Bliss, Mr. R. D. Carmichael, Dr. A. B. Chace, Dr. A. Cohen, Dr. G. M. Conwell, Dr. L. S. Dederick, Professor L. P. Eisenhart, Professor T. C. Esty, Professor H. B. Fine, Dr. G. F. Gundelfinger, Dr. Frank Irwin, Professor Edward Kasner, Mr. A. K. Krause, Professor W. R. Longley, Mr. H. H. Mitchell, Professor J. H. Maclagan-Wedderburn, Mr. H. F. MacNeish, Professor E. H. Moore, Professor Frank Morley, Professòr G. D. Olds, Mr. W. J. Risley, Professor Virgil Snyder, Mr. C. E. Van Orstrand, Professor E. B. Van Vleck, Professor Oswald Veblen, Professor H. S. White, Professor J. E. Wright.

Two courses of lectures were given, as follows:

I. Professor G. A. BLISS: "Fundamental existence theorems." Four lectures.

II. Professor EDWARD KASNER: "Geometric aspects of dynamics." Four lectures.

Two lectures were given each morning, one on Wednesday afternoon, and one at noon on Friday, the lecturers alternating. Printed syllabi of both courses had been issued in advance, as usual. Thursday afternoon was devoted to an excursion to Washington's Headquarters, carriages and automobiles being provided by Dean Fine and Mr. Pyne, of the University. The evenings were spent in social conference at the Princeton

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* For the history of the preceding colloquia, see the Report of the New Haven Colloquium, BULLETIN, vol. 13 (1906-07), page 71, where complete references are given.

Inn, the general headquarters of the meeting. The hospitality of Princeton University, and particularly of the mathematical department, was gratefully acknowledged by a vote of thanks at the closing meeting.

The following abstracts of the lectures convey a general idea of their content. More detailed reports by the lecturers will appear in later numbers of the BULLETIN.

I. The earlier part of Professor Bliss's course was devoted to a review of the theory of implicit functions, including a detailed account of some of the recent developments in the subject, with their applications in the calculus of variations. The existence theorems for ordinary differential equations were taken up with special reference to the definition of solutions over an extended region and their behavior as functions of the initial constants. A short account of the geometrical theory of partial differential equations of the first order was given, and with this as a guide the results already obtained were applied to show the existence of solutions of such equations, even when the function defining the equation is not analytic. The theory of implicit functions for real variables and some knowledge of the methods of approximation of Cauchy and Picard for ordinary differential equations were presupposed.

II. All physical phenomena take place in space and may therefore suggest geometric investigation. In this connection the attention given to kinetics has been slight in comparison with that devoted to statics and kinematics. Professor Kasner's lectures dealt with geometric aspects of kinetics. Such topics as the following were treated :

Conservative systems, the principle of least action, reduction to geodesics, Thomson's theorem, natural families, conformal transformations (Larmor, Goursat, Darboux). General fields of force, trajectories, geometric explorations. Projective properties and Appell's transformation. Interrelations of catenaries, brachistochrones, and tautochrones. Representation of time (Minkowski) ; representation of phase in statistical mechanics. Transformations of time, contact transformations. Problem of several bodies. Non-holonome systems and Hertz's geometry of material systems. Optics and elasticity.

VIRGIL SNYDER.