

# GENERAL DIFFERENTIAL GEOMETRIES AND RELATED TOPICS\*

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## I. INTRODUCTION

**1. Scope of the paper.** The main purpose of this paper is to give an account of the author's recent researches on differential geometry with general coordinates.† In these geometries the *geometric space* is taken to be a Hausdorff topological space, while the *coordinate space* is taken to be a linear topological space. Several important topics in general analysis had their inception in these differential geometric researches. Such analytical topics come under the following captions: completely integrable abstract differential equations,‡ boundary value problems in general analysis,§ general continuous group theory with abstract parameters,|| abstract analytic functions,¶ the Michal-Paxson differential in special linear topological spaces,\*\* and the *M*-differential in linear topological spaces.†† A detailed account, or even a brief account, of most of these purely analytical matters is, however, out of the question here.

We are convinced that the subject of general differential geometry is destined to become one of the great branches of mathematics, comparable to the present status of general (abstract) algebra and general analysis. There is still time for a whole army of young mathematicians to earn their first laurels in general differential geometry while the subject is still in its infancy.

**2. Special instances and special features.** The differential geometries treated are *dimensionless* in the sense that no dimensionality postulate (finite or infinite) is specified. The general theory thus contains as instances the classical Riemannian and non-Riemannian geometries with finite or infinite number of dimensions. An account of these instances has, however, been crowded out. The interested reader

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\* An address delivered before the Berkeley meeting of the Society on April 9, 1938, by invitation of the Program Committee.

† Michal [6-13]. The numbers refer to the entries in the bibliography at the end of the paper.

‡ Michal and Elconin [1, 3].

§ Michal and Hyers [1].

|| Michal and Paxson [1, 2]; Michal and Elconin [2]; Michal, Highberg, and Taylor [1].

¶ Martin [1]; Michal and Martin [1]; Michal and Clifford [1]; Taylor [2-6].

\*\* Michal and Paxson [3, 4].

†† Michal [13].