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GEODESIC MAPPINGS AND THEIR GENERALIZATIONS

J. Mikeš, V. E. Berezovski, E. Stepanova, and H. Chudá UDC 514.7

Abstract. This paper is devoted to further study of the theory of geodesic mappings and their generalizations, including conformal, holomorphically projective, F-planar, and almost geodesic mappings of affinely connected spaces.

CONTENTS

1. Introduction

This paper is devoted to further study of the theory of geodesic mappings and their generalizations, including conformal, holomorphically projective, F-planar, and almost geodesic mappings of affinely connected spaces. These theories go back to the paper [115] of Levi-Civita, in which the problem on the search for Riemannian spaces with common geodesics was stated and solved in a special coordinate system. We note a remarkable fact that this problem is related to the study of equations of dynamics of mechanical systems.

The theory of geodesic mappings has been developed by Thomas, Weyl, Shirokov, Kagan, Vrănceanu, Rashevski, Shapiro, Vedenyapin, Solodovnikov, Sinyukov, Mikeš, and others (see [21, 27, 40, 42, 43, 48, 48, 55, 96, 112, 119, 129, 142, 143]).

In [41], Petrov introduced the notion of quasi-geodesic mappings. In particular, holomorphically projective mappings of Kählerian spaces are special quasi-geodesic mappings; they were examined by Otsuki and Tashiro [130, 141], Prvanović [131] and others (see [1, 25, 28, 34, 48, 49, 61, 62, 111, 112, 120, 129, 142, 143]).

A natural generalization of these classes of mappings is the class of almost geodesic mappings introduced by Sinyukov (see [44–49]); he also specified three types of almost geodesic mappings π_1, π_2, and π_3.

Recently, many new results have been obtained, which were not included in the reviews by Sinyukov [49] and Mikeš [119, 120] (see also [19, 105]).

In the sequel, we assume that all spaces considered are simply connected and their dimensions >2 unless otherwise stated. All geometric objects are assumed to be continuous and sufficiently smooth.

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J. Mikeš
Palacky University, Olomouc, Czech Republic
E-mail: josef.mikes@upol.cz
V. E. Berezovski
Uman National University of Horticulture, Uman, Ukraine
E-mail: berez.volod@rambler.ru
E. Stepanova
Palacky University, Olomouc, Czech Republic
E-mail: stephelena@list.ru
H. Chudá
Tomas Bata University in Zlin, Czech Republic
E-mail: chuda@ft.utb.cz