

# Mappings of finite distortion: Removable singularities

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## 1 Introduction

We call a mapping  $f \in W_{loc}^{1,1}(\Omega, \mathbb{R}^n)$  a *mapping of finite distortion* if it satisfies

$$|Df(x)|^p \leq K(x)J(x, f) \quad \text{a.e.,}$$

where  $K(x) < \infty$  and if also  $J(\cdot, f) \in L_{loc}^1(\Omega)$ . Here and in the sequel  $\Omega \subset \mathbb{R}^n$  is open, connected, and bounded. The basics of the theory of mappings of finite distortion have been established in the papers [1], [2], [3], [4], [5], [10], [11] and [12], also see the monograph [7]. In these works it has been demonstrated that (sub)exponential integrability in the sense described below is both sufficient and essentially necessary for the validity of many basic properties similar to those of mappings of bounded distortion, that is, mappings of finite distortion with  $K \in L^\infty$ . However, there are still many other properties of mappings of bounded distortion, also called quasiregular mappings, for which no analog is known in our more general setting, see the monographs [13], [14], [8], [16].

The purpose of this note is to study the question of removable singularities for bounded mappings of finite distortion. Our principal message is that sufficiently small sets are indeed removable under the (sub)exponential integrability assumption on  $K$  whereas even a single point can fail to be removable under weaker integrability assumptions.

Let us next describe what we mean by (sub)exponential integrability. Let  $\Phi : [0, \infty) \rightarrow [0, \infty)$  be a strictly increasing, differentiable function. We call such functions Orlicz functions and we make the following two assumptions:

$$(\Phi-1) \quad \int_1^\infty \frac{\Phi(t)}{t} dt = \infty,$$

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# Mappings Of Finite Distortion Removable Singularities

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Tamrazov**



## **Mappings Of Finite Distortion Removable Singularities:**

**Mappings of Finite Distortion** Kai Rajala, 2003      Lectures on Mappings of Finite Distortion Stanislav Hencl, Pekka Koskela, 2014-01-24 In this book we introduce the class of mappings of finite distortion as a generalization of the class of mappings of bounded distortion Connections with models of nonlinear elasticity are also discussed We study continuity properties behavior of our mappings on null sets topological properties like openness and discreteness regularity of the potential inverse mappings and many other aspects      *Mappings of Finite Distortion* Kai Rajala, 2002      **Moduli in Modern Mapping Theory** Olli Martio, Vladimir Ryazanov, Uri Srebro, Eduard Yakubov, 2008-11-09 Based on recent research papers this book presents a modern account of mapping theory with emphasis on quasiconformal mapping and its generalizations It contains an extensive bibliography      **The Beltrami Equation** Vladimir Gutlyanskii, Vladimir Ryazanov, Uri Srebro, Eduard Yakubov, 2012-04-23 This book is devoted to the Beltrami equations that play a significant role in Geometry Analysis and Physics and in particular in the study of quasiconformal mappings and their generalizations Riemann surfaces Kleinian groups Teichmüller spaces Clifford analysis meromorphic functions low dimensional topology holomorphic motions complex dynamics potential theory electrostatics magnetostatics hydrodynamics and magneto hydrodynamics The purpose of this book is to present the recent developments in the theory of Beltrami equations especially those concerning degenerate and alternating Beltrami equations The authors study a wide circle of problems like convergence existence uniqueness representation removal of singularities local distortion estimates and boundary behavior of solutions to the Beltrami equations The monograph contains a number of new types of criteria in the given problems particularly new integral conditions for the existence of regular solutions to the Beltrami equations that turned out to be not only sufficient but also necessary The most important feature of this book concerns the unified geometric approach based on the modulus method that is effectively applied to solving the mentioned problems Moreover it is characteristic for the book application of many new concepts as strong ring solutions tangent dilatations weakly flat and strongly accessible boundaries functions of finite mean oscillations and new integral conditions that make possible to realize a more deep and refined analysis of problems related to the Beltrami equations Mastering and using these new tools also gives essential advantages for the reader in the research of modern problems in many other domains Every mathematics graduate library should have a copy of this book      The  $p$ -Harmonic Equation and Recent Advances in Analysis Pietro Poggi-Corradini, 2005 Comprised of papers from the IIIrd Prairie Analysis Seminar held at Kansas State University this book reflects the many directions of current research in harmonic analysis and partial differential equations Included is the work of the distinguished main speaker Tadeusz Iwaniec his invited guests John Lewis and Juan Manfredi and many other leading researchers The main topic is the so called  $p$  harmonic equation which is a family of nonlinear partial differential equations generalizing the usual Laplace equation This study of  $p$  harmonic equations touches upon many areas of analysis with deep relations to functional

analysis potential theory and calculus of variations The material is suitable for graduate students and research mathematicians interested in harmonic analysis and partial differential equations *Geometric Function Theory and Non-linear Analysis* Tadeusz Iwaniec, Gaven Martin, 2001 This unique book explores the connections between the geometry of mappings and many important areas of modern mathematics such as Harmonic and non linear Analysis the theory of Partial Differential Equations Conformal Geometry and Topology Much of the book is new It aims to provide students and researchers in many areas with a comprehensive and up to date account and an overview of the subject as a whole *Israel Journal of Mathematics* Mo'atsah ha-le'umit le-mehkar ule-fituah (Israel), 2003 *Annales Academiae Scientiarum Fennicae*, 2007 *Revue Roumaine de Mathématiques Pures Et Appliquées*, 2006 **Journal of Zhejiang University**, 2005

**Mathematical Reviews**, 2007 Generalized Solutions of a System of Differential Equations of the First Order and Elliptic Type with Discontinuous Coefficients Bogdan Bojarski, 2009 *Quasiconformal Mappings and Sobolev Spaces* V.M. Gol'dshtein, Yu.G. Reshetnyak, 2012-12-06 Ht moi si j avait su comment en revenir One lemce mathematics has rendered the je n y serai point aile human race It has put common sense back Jule Verne it belong on the topmost shelf next to the dusty caniller labelled discarded non The series is divergent therefore we may be sense able to do something with it Eric T Bell O Heavside Mathematics is a tool for thought A highly necessary tool in a world where both feedback and non linearities abound Similarly all kinds of parts of mathematics serve as tools for other parts and for other sciences Applying a simple rewriting rule to the quote on the right above one finds such statements as One service topology has rendered mathematical physics One service logic has rendered com puter science One service category theory has rendered mathematics All arguably true And all statements obtainable this way form part of the raison d re of this series **Nonlinear Differential Forms** Tadeusz Iwaniec, 1998 *Mathematics of the USSR.*, 1973 *Soviet Mathematics*, 1970 *Complex Analysis And Potential Theory - Proceedings Of The Conference Satellite To Icm 2006* T Aliyev Azeroglu, Promarz M Tamrazov, 2007-08-13 This volume gathers the contributions from outstanding mathematicians such as Samuel Krushkal Reiner K hnau Chung Chun Yang Vladimir Miklyukov and others It will help researchers to solve problems on complex analysis and potential theory and discuss various applications in engineering The contributions also update the reader on recent developments in the field Moreover a special part of the volume is completely devoted to the formulation of some important open problems and interesting conjectures **Complex Analysis and Potential Theory** Tahir Aliyev Azero?lu, Promarz Melikovich Tamrazov, 2007 This volume gathers the contributions from outstanding mathematicians such as Samuel Krushkal Reiner K hnau Chung Chun Yang Vladimir Miklyukov and others It will help researchers to solve problems on complex analysis and potential theory and discuss various applications in engineering The contributions also update the reader on recent developments in the field Moreover a special part of the volume is completely devoted to the formulation of some important open problems and interesting conjectures Kōdai Mathematical Seminar Reports, 1949

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