

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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