François Fillastre · Dmitriy Slutskiy *Editors*

Reshetnyak's Theory of Subharmonic Metrics

Despite the fundamental role played by Reshetnyak's work in the theory of surfaces of bounded integral curvature, the proofs of his results were only available in his original articles, written in Russian and often hard to find. This situation used to be a serious problem for experts in the field. This book provides English translations of the full set of Reshetnyak's articles on the subject. Together with the companion articles, this book provides an accessible and comprehensive reference for the subject. In turn, this book should concern any researcher (confirmed or not) interested in, or active in, the field of bounded integral curvature surfaces, or more generally interested in surface geometry and geometric analysis. Due to the analytic nature of Reshetnyak's approach, it appears that his articles are very accessible for a modern audience, comparing to the works using a more synthetic approach. Chapters 7, 8, 12, and 13 are available open access under Creative Commons attribution-noncommercial 4.0 International License via **link.springer.com**.

These articles of Reshetnyak concern more precisely the work carried by the author following the completion of his PhD thesis, under the supervision of A.D. Alexandrov. Over the period from the 1940's to the 1960's, the Leningrad School of Geometry, developed a theory of the metric geometry of surfaces, similar to the classical theory of Riemannian surfaces, but with lower regularity, allowing greater flexibility. Let us mention A.D. Alexandrov, Y.D. Burago and V.A. Zalgaller. The types of surfaces studied by this school are now known as surfaces of bounded curvature. Particular cases are that of surfaces with curvature bounded from above or below, the study of which gained special attention after the works of M. Gromov and G. Perelman. Nowadays, these concepts have been generalized to higher dimensions, to graphs, and so on, and the study of metrics of weak regularity remains an active and challenging field.

Reshetnyak developed an alternative and analytic approach to surfaces of bounded integral curvature. The underlying idea is based on the theorem of Gauss which states that every Riemannian surface is locally conformal to Euclidean space. Reshetnyak thus studied generalized metrics which are locally conformal to the Euclidean metric with conformal factor given by the logarithm of the difference between two subharmonic functions on the plane. Reshetnyak's condition appears to provide the correct regularity required to generalize classical concepts such as measure of curvature, integral geodesic curvature for curves, and so on, and in turn, to recover surfaces of bounded curvature.

ISBN 978-3-031-24254-0

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CENTRE DE RECHERCHES MATHÉMATIQUES

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