

# Foreword

Teichmüller theory, in a broad sense, includes the study of parameter spaces for geometric structures on surfaces and of representations of fundamental groups of surfaces into various Lie groups. This theory also involves the study of actions of mapping class groups and other groups on various spaces, including Teichmüller spaces, character varieties of representations, simplicial complexes built from systems of homotopy classes of simple closed curves or arcs, spaces of laminations and of equivalence classes of foliations equipped with various kinds of structures, and there are many others. Techniques from several fields are used (complex analysis, hyperbolic geometry, partial differential equations, affine differential geometry, geometric and combinatorial group theory, algebraic geometry, Kähler geometry, etc.) and this often gives several points of view on the same object studied. The present Handbook is an attempt to present in a consistent and systematic way the various points of view, ideas and techniques and the rich interaction between them.

Among the twenty-three chapters that this volume contains, seven are dedicated to the ideas that Alexander Grothendieck brought into Teichmüller theory and the theory of moduli spaces of Riemann surfaces. To the multitude of fields which Teichmüller theory unites, Grothendieck added number theory and the actions of the absolute Galois group. The present volume is dedicated to his memory. We are especially respectful of his courageous engagement against the mainstream ideas.

This volume is divided into five parts:

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The number after each part indicates that it is a sequel to a part carrying the same name in a previous volume of the Handbook.

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