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A ROUGH FUNDAMENTAL DOMAIN FOR TEICHMÜLLER SPACES

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Let $T(S)$ be the Teichmüller space of Riemann surfaces of finite type and let $M(S)$ be the corresponding modular group. In **[11]** we described $T(S)$ in terms of real analytic parameters. In this paper we determine a subspace $R(S)$ of $T(S)$ which is a "rough fundamental domain" for $M(S)$ acting on $T(S)$. The construction of $R(S)$ is a generalization of the constructions in **[14]** and **[15]**. The previous constructions depended heavily upon an analysis of the action of the elements of $M(S)$ on parameters of $T(S)$ corresponding to disjoint closed geodesics on S, and on a theorem of Bers **[2]** which gives bounds for the lengths of these curves. In the general case, the disjoint closed geodesics of Bers' theorem no longer always correspond directly to the parameters. Hence we must carefully study how their lengths are related to the parameters.

In §1 we outline the basic preliminary notions relating hyperbolic geometry, Fuchsian groups and Teichmüller spaces.

In §§2 and 3 we give the constructions of Teichmüller space and of a fundamental domain for the action of the modular group in the simplest cases; that is, where S has type (0; 3) and (1; 1).

In §4 we give a detailed discussion of the Teichmüller space and of the fundamental domain in the case (0; 4). These constructions are the heart of the general constructions which follow.

In §5 we discuss the special case of surfaces of genus 2 and state Bers' theorem. In §6 we give the construction of Teichmüller space in general.

In §7 we analyze the topologically distinct sets of mutually disjoint geodesics which occur in Bers' theorem and determine their relationship to the moduli curves.

Finally, in §8 we put all the pieces of the construction together and determine the rough fundamental domain.

In §9 we use this construction to affirmatively settle a conjecture of Bers **[3]**.

1. Preliminaries. Let S be a compact Riemann surface of genus g from which n points and m conformal disks have been removed. Assume, moreover, integers ν_i have been assigned to the n points, $2 \leqslant \nu_1 \leqslant \cdots \leqslant \nu_n \leqslant \infty$. S is said to be of type $(g; n; m)$ or have signature $(g; n; m; \nu_1, \ldots, \nu_n)$.

Let S be such a Riemann surface and let $\mathfrak{B}$ be a canonical basis for the fundamental group of S, $\pi_1(S)$:

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