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Teichmuller theory of bordered surfaces

We propose the graph description of Teichmüller theory of surfaces with marked points on boundary components (bordered surfaces). Introducing new parameters, we formulate this theory in terms of hyperbolic geometry. We can then describe both classical and quantum theories having the proper number of Thurston variables (foliation-shear coordinates), mapping-class group invariance (both classical and quantum), Poisson and quantum algebra of geodesic functions, and classical and quantum braid-group relations. These new algebras can be defined on the double of the corresponding graph related (in a novel way) to a double of the Riemann surface (which is a Riemann surface with holes, not a smooth Riemann surface). We enlarge the mapping class group allowing transformations relating different Teichmüller spaces of bordered surfaces of the same genus, same number of boundary components, and same total number of marked points but with arbitrary distributions of marked points among the boundary components. We describe the classical and quantum algebras and braid group relations for particular sets of geodesic functions corresponding to A_n and D_n algebras.