Topological Gravity

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A note of [DW18].

1 Introduction

There are two approaches to study 2D quantum gravity. One is through matrix model, which is developed in 1980's, see [FGZ95] for a comprehensive review. The other one is through topological gravity, whose corelators are given by the intersection numbers on the moduli space of Riemann Surfaces. Witten conjectured that these two approaches are equivalent[Wit90a, Wit90b], and his conjecture is proved by Kontsevich[Kon92]. Mirzakhani also gave a new proof of Witten conjecture by using her recursion relations for Weil-Petersson volume $V_{g,\boldsymbol{b}}$ of moduli space of hyperbolic metrics on Riemann surface of genus g with n boundaries, where boundaries are geodesics of length $\boldsymbol{b} = (b_1, \ldots, b_n)$.

2 Matrix Model

Given a surface of genus g, we consider the vector space consisting of metrics allowed on σ.

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