

Kabanov, Alexandre; Kimura, Takashi

Intersection numbers and rank one cohomological field theories in genus one. (English)

Zbl 0974.14018

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The tautological classes κ , ψ , λ on the moduli space of curves $\mathcal{M}_{g,n}$ (of genus g with n punctures) have recently become of central importance in mathematics and physics, following the work of E. Witten e.g., which links their significance in intersection theory, topological gravity, and non-linear partial differential equations [J. Differ. Geom., Suppl. 1, 243-310 (1991; Zbl 0808.32023)].

In this paper, the authors introduce a novel presentation of the tautological classes based on boundary strata of a compactification of $\mathcal{M}_{g,n}$, and they use its combinatorial properties to derive equations for the generating function of their intersection numbers, which generalize Witten's puncture and dilaton equations.

In the second part of the paper, the authors apply the results of the first to extend to genus 1 an analysis by *R. Kaufmann*, *Yu. I. Manin* and *D. Zagier* [Commun. Math. Phys. 181, No. 3, 763-787 (1996; Zbl 0890.14011)] according to which the moduli space of cohomological field theories has additive coordinates for the tensor product; in the genus 1 case, it is necessary to add one coordinate to account for the Mumford class λ .

Reviewer: [Emma Previato \(Boston\)](#)

MSC:

- 14H10 Families, moduli of curves (algebraic)
- 14H20 Singularities of curves, local rings
- 81T70 Quantization in field theory; cohomological methods
- 35Q53 KdV equations (Korteweg-de Vries equations)

Cited in **1** Review
Cited in **7** Documents

Keywords:

moduli spaces of curves; graphs; Weil-Petersson volumes; tautological classes; boundary strata of a compactification

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