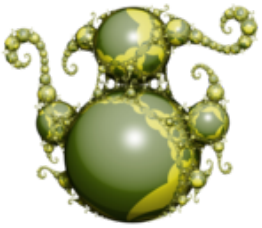

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Theta classes, r-KdV and W-constraints

lundi 26 mai 2025 10:00 (1 heure)

Witten's conjecture, proved by Kontsevich, states that the generating series for intersection numbers on the moduli space of curves is a tau-function for the KdV integrable hierarchy. It can be reformulated as the statement that the descendant potential of the trivial cohomological field theory is the unique solution to a system of differential constraints that form a representation of the Virasoro algebra, known as Virasoro constraints. In this talk I will present a new generalization of this celebrated result. We study an interesting set of cohomology classes on the moduli space of curves, the (r, s)-theta classes, which form a (non-semisimple) cohomological field theory. (Here, r is a positive integer greater than or equal to 2, and s is a positive integer between 1 and $r - 1$.) These classes are constructed as the top degrees of the Chiodo classes and can be understood as a vast generalization of the Witten r-spin classes and the Norbury classes (the latter being the special case $r = 2$, $s = 1$). We show that the descendant integrals satisfy the "generalized topological recursion" of Alexandrov, Bychkov, Dunin-Barkowski, Kazarian and Shadrin on the (r, s) spectral curve. As a consequence, we prove that the descendant potential is a tau function for the r-KdV integrable hierarchy, generalizing the Brézin-Gross-Witten tau function (the $r = 2$, $s = 1$ case). We also show that the descendant potential satisfies W-constraints: namely, it is annihilated by a collection of differential operators that form a representation of the $W(\mathfrak{gl}_r)$-algebra at self-dual level. Interestingly, the W-constraints uniquely fix the potential only in the cases $s = 1$ and $s = r - 1$.

This is joint work with N. K. Chidambaram, A. Giacchetto and S. Shadrin.

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