

Contents

0	Introduction	3
1	Preliminaries	7
1.1	Chord diagrams	7
1.2	Quasi-tangles	10
2	The modified Kontsevich invariant	15
2.1	Definition of the modified Kontsevich invariant	15
2.2	Associator Φ	18
2.3	Isotopy invariance of $\hat{Z}(L)$	20
3	The modified Kontsevich invariant and quantum invariants	22
3.1	Substitution of Lie algebra and its representation into a chord diagram	23
3.2	Recovery of the quantum (\mathfrak{g}, R) invariant from the modified Kontsevich invariant	26
4	The modified Kontsevich invariant and Vassiliev invariants	30
4.1	Vassiliev invariants of framed knots	30
4.2	Universality of the modified Kontsevich invariant among Vassiliev invariants	33
5	Vassiliev invariants and quantum invariants	36
6	The universal perturbative invariant of 3-manifolds	39
6.1	Properties of $\hat{Z}(L)$	39
6.2	Replacing solid circles with dashed graphs	47
6.3	Relation P_n	51
6.4	Invariants of 3-manifolds	57
7	Finite type invariants and the universal perturbative invariant	60
7.1	Finite type invariants of integral homology 3-spheres	60