TOPOLOGICAL COMPLEXITY OF ENUMERATIVE PROBLEMS IN ALGEBRAIC GEOMETRY

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Abstract:

Typical enumerative problems in algebraic geometry include finding the d roots of a generic polynomial in one variable of degree d, finding the 27 lines on a smooth cubic surface, and their higher dimensional analogs. We introduce the concept of topological complexity of enumerative problems, which is a positive integer that measures the least possible number of "branches" in the algorithms that solves an enumerative problem up to an ϵ error. We are interested in the lower bounds of the topological complexity of enumerative problems. We introduce finite covering spaces associated to the enumerative problems and the concept of Schwarz genus of a covering space, which produces lower bounds of the topological complexity, and can be detected by cohomology. Finally, we present lower bounds of three enumerative problems.

This is a joint work with Weiyan Chen.