Quantum cohomology and mirror symmetry for quasi-homogeneous singularities

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Abstract

I will describe recent joint work with Huijun Fan and Yongbin Ruan in which we construct a moduli space of decorated stable curves and a virtual cycle on that space for every non-degenerate quasi-homogeneous singularity. Moreover, for each automorphism of the singularity, we associate a cohomology ring (Poincare dual to the vanishing cycles of the "sub-singularity" fixed by the automorphism) . The virtual cycle can be used to put a new ring structure on these cohomology rings, endowing them with the structure of a G-Frobenius algebra, which we might call the "quantum cohomology of the singularity."

In the cases computed so far, the quantum cohomology of the singularity is "mirror dual" to the orbifold Milnor ring (or orbifold Landau-Ginzburg B-model) described by Kaufmann and Intriligator-Vafa. In the special case of the A_n singularity, our constructions give a refinement of the theory of higher spin curves.