Grassi, Michele

Self-dual manifolds and mirror symmetry for the quintic threefold. (English) Zbl 1085.14035

Asian J. Math. 9, No. 1, 79-101 (2005).

The author describes a way to geometrically interpolate between the large Kähler structure limit of the Kähler moduli space of the anticanonical divisor in $\mathbb{P}^n$ and a large complex structure limit of the complex structure moduli space of the mirror partner given by the *B. R. Greene, M. R. Plesser* orbifold construction [Duality in Calabi-Yau moduli space, Nucl. Phys. B338, 15–37 (1990)]. This is achieved by constructing a two-dimensional family of smooth manifolds $\mathbb{X}_{\rho_1,\rho_2}$ of real dimension $(3(n-1)+2)$ endowed with a "weakly self-dual" (WSD) structure. A WSD structure consists of three closed 2-forms and a Riemannian metric satisfying certain integrability and compatibility conditions. Taking appropriate limiting values for ρ_1 and ρ_2, the manifolds $\mathbb{X}_{\rho_1,\rho_2}$ approach the large Kähler structure limit of the anticanonical divisor and the large complex structure limit of the mirror in a normalized Gromov-Hausdorff sense.

The construction starts with the fiber product $(\mathbb{C}^*)^{n+1}\times_\mu(\mathbb{C}^*)^{n+1}$ over $\mathbb{R}^{n+1}$, where $\mu:(\mathbb{C}^*)^{n+1}\to\mathbb{R}^{n+1}$ is the usual T^{n+1}-moment map given by rotating the coordinates. The WSD manifolds arise from a sort of "polysymplectic reduction" of $(\mathbb{C}^*)^{n+1}\times_\mu(\mathbb{C}^*)^{n+1}$ by a group action arising from the reflexive polytope construction of $\mathbb{P}^n$ and its toric dual.

Reviewer: Edward Lee (Los Angeles)

MSC:

14J32 Calabi-Yau manifolds (algebro-geometric aspects)
14M25 Toric varieties, Newton polyhedra, Okounkov bodies

Keywords:

reflexive polytopes; Gromov-Hausdorff distance

Full Text: DOI arXiv