ABSTRACT

Gromov-Witten theory started as an attempt to provide a rigorous mathematical foundation for the so-called A-model topological string theory of Calabi-Yau varieties. Even though it can be defined for all the Kähler/symplectic manifolds, the theory on Calabi-Yau varieties remains the most difficult one. In fact, a great deal of techniques were developed for non-Calabi-Yau varieties during the last twenty years. These techniques have only limited bearing on the Calabi-Yau cases. In a certain sense, Calabi-Yau cases are very special too. There are two outstanding problems for the Gromov-Witten theory of Calabi-Yau varieties and they are the focus of our investigation.