The Kodaira dimension of moduli of curves with spin and principal bundles

Abstract:
In the recent period, a series of papers carried out a deep analysis of the singular locus of the moduli space of stable (twisted) curves with an \( \ell\)-torsion line bundle. This opens the way to a computation of the Kodaira dimension without desingularizing, as done by Farkas and Ludwig for \( \ell=2 \), and by Chiodo, Eisenbud, Farkas and Schreyer for \( \ell=3 \).

We can generalize these works in two directions. At first we treat roots of line bundles on the universal curve systematically: we consider the moduli space of curves \( C \) with a line bundle \( L \) such that \( L^\ell = \omega^k \).

Furthermore, we treat moduli spaces of curves with a \( G \)-cover, where \( G \) is any finite group. In particular for \( G=S_3 \) we prove that the moduli space is of general type for odd genus >11.

To analyze canonical and non-canonical singularities, we provide a set of combinatorial tools allowing the description of the singular locus via the dual graphs of curves.

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