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Simplification of ?-ring expressions in the Grothendieck ring of Chow motives

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Abstract-

The Grothendieck ring of Chow motives admits two natural opposite λ-ring structures, one of which is a special structure allowing the definition of Adams operations on the ring. In this work I present algorithms which allow an effective simplification of expressions that involve both λ-ring structures, as well as Adams operations. In particular, these algorithms allow the symbolic simplification of algebraic expressions in the sub-λ-ring of motives generated by a finite set of curves into polynomial expressions in a small set of motivic generators. As a consequence, the explicit computation of motives of some moduli spaces is performed, allowing the computational verification of some conjectural formulas for these spaces.

Index Terms- Lambda-rings; Symbolic computations of motives; Chow motives; Moduli spaces; Higgs bundles moduli space

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