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Detecting Infinitely Many Irreducible Representations in a Fixed Finite Dimension

Let n be a positive integer, let k be a field (of arbitrary characteristic), and let R be a finitely presented k -algebra. We consider the problem of algorithmically determining whether or not R has infinitely many distinct equivalence classes of irreducible n -dimensional representations. The approach combines Artin–Procesi Theory, Shirshov’s Theorem, and computational commutative algebra.