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Autor: Mumford, David

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STABILITY OF PROJECTIVE VARIETIES [1])

by David Mumford

CONTENTS

INTRODUCTION

The most direct approach to the construction of moduli spaces of algebraic varieties is via the theory of invariants: one describes the varieties by some sort of numerical projective data, canonically up to the action of some algebraic group, and then seeks to make these numbers canonical by applying invariant polynomials to the data, or equivalently by forming a quotient of the data by the group action. The main difficulty in this approach is to prove that "enough invariants exist": their values on the projective data must distinguish non-isomorphic varieties.

Take as an example the moduli space $\mathscr{M}_g$ of curves of genus $g \geqq 2$ over some algebraically closed field k. Given C, such a curve, we obtain by choosing a basis B of $\Gamma\left(C, (\Omega_c^1)^{\otimes l}\right)$, an embedding $\Phi: C \to \mathbf{P}^{(2l-1)(g-1)-1}$

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[1]) Lectures given at the "Institut des Hautes Etudes Scientifiques", Bures-sur-Yvette (France), March-April 1976, under the sponsorship of the International Mathematical Union. Notes by Ian Morrison.