



# Algebraic Surfaces

**Kunihiko Kodaira**



## **Algebraic Surfaces:**

**Algebraic Surfaces** Lucian Badescu, 2013-03-14 The aim of this book is to present certain fundamental facts in the theory of algebraic surfaces defined over an algebraically closed field  $k$  of arbitrary characteristic The book is based on a series of talks given by the author in the Algebraic Geometry seminar at the Faculty of Mathematics University of Bucharest The main goal is the classification of nonsingular projective surfaces also called simply surfaces In the context of complex algebraic varieties the classification was obtained by Enriques and Castelnuovo Around 1960 Kodaira Kodl Kod2 revived and simplified the classification of complex algebraic surfaces and extended it to the case of compact analytic surfaces The problem of classifying surfaces in arbitrary characteristic remained open The first step in this direction was the purely algebraic proof valid in arbitrary characteristic due to Zariski Zar1 Zar2 of Castelnuovo's criterion of rationality Then Mumford Mum3 Mum4 introduced several new ideas and the classification of surfaces in positive characteristic became possible Finally Bombieri and Mumford BM1 BM2 completed the classification of surfaces in arbitrary characteristic Their result was the following The same types of surfaces that exist in the case when  $k$  is the complex field arise in the general case if one sets aside certain pathologies that arise only in characteristic 2 or 3

**Algebraic Surfaces** Oscar Zariski, 2012-12-06 The aim of the present monograph is to give a systematic exposition of the theory of algebraic surfaces emphasizing the interrelations between the various aspects of the theory algebro geometric topological and transcendental To achieve this aim and still remain inside the limits of the allotted space it was necessary to confine the exposition to topics which are absolutely fundamental The present work therefore makes no claim to completeness but it does however cover most of the central points of the theory A presentation of the theory of surfaces to be effective at all must above all give the typical methods of proof used in the theory and their underlying ideas It is especially true of algebraic geometry that in this domain the methods employed are at least as important as the results The author has therefore avoided as much as possible purely formal accounts of results The proofs given are of necessity condensed for reasons of space but no attempt has been made to condense them beyond the point of intelligibility In many instances due to exigencies of simplicity and rigor the proofs given in the text differ to a greater or less extent from the proofs given in the original papers

*Non-complete Algebraic Surfaces* M. Miyanishi, 2006-11-15 *On Degenerations of Algebraic Surfaces* Ulf Persson, 1977 We will study the relationships between the components of a singular fiber and the non singular fiber in a family of surfaces over a disc Special emphasis will be put on the ties with classification theory of surfaces

**Real Algebraic Surfaces** Robert Silhol, 2006-11-14 **Algebraic Surfaces and Holomorphic Vector Bundles** Robert Friedman, 2012-12-06 This book is based on courses given at Columbia University on vector bundles 1988 and on the theory of algebraic surfaces 1992 as well as lectures in the Park City IAS Mathematics Institute on 4 manifolds and Donaldson invariants The goal of these lectures was to acquaint researchers in 4 manifold topology with the classification of algebraic surfaces and with methods for describing moduli spaces of

holomorphic bundles on algebraic surfaces with a view toward computing Donaldson invariants Since that time the focus of 4 manifold topology has shifted dramatically at first because topological methods have largely superseded algebro geometric methods in computing Donaldson invariants and more importantly because of and Witten which have greatly simplified the new invariants defined by Seiberg simplified the theory and led to proofs of the basic conjectures concerning the 4 manifold topology of algebraic surfaces However the study of algebraic surfaces and the moduli spaces of bundles on them remains a fundamental problem in algebraic geometry and I hope that this book will make this subject more accessible Moreover the recent applications of Seiberg Witten theory to symplectic 4 manifolds suggest that there is room for yet another treatment of the classification of algebraic surfaces In particular despite the number of excellent books concerning algebraic surfaces I hope that the half of this book devoted to them will serve as an introduction to the subject

Algebraic Surfaces In Positive Characteristics: Purely Inseparable Phenomena In Curves And Surfaces Masayoshi Miyanishi, Hiroyuki Ito, 2020-06-29

Customarily the framework of algebraic geometry has been worked over an algebraically closed field of characteristic zero say over the complex number field However over a field of positive characteristics many unpredictable phenomena arise where analyses will lead to further developments In the present book we consider first the forms of the affine line or the additive group classification of such forms and detailed analysis The forms of the affine line considered over the function field of an algebraic curve define the algebraic surfaces with fibrations by curves with moving singularities These fibrations are investigated via the Mordell Weil groups which are originally introduced for elliptic fibrations This is the first book which explains the phenomena arising from purely inseparable coverings and Artin Schreier coverings In most cases the base surfaces are rational hence the covering surfaces are unirational There exists a vast unexplored world of unirational surfaces In this book we explain the Frobenius sandwiches as examples of unirational surfaces Rational double points in positive characteristics are treated in detail with concrete computations These kinds of computations are not found in current literature Readers by following the computations line after line will not only understand the peculiar phenomena in positive characteristics but also understand what are crucial in computations This type of experience will lead the readers to find the unsolved problems by themselves

Open Algebraic Surfaces Masayoshi Miyanishi, 2001 Open algebraic surfaces are a synonym for algebraic surfaces that are not necessarily complete An open algebraic surface is understood as a Zariski open set of a projective algebraic surface There is a long history of research on projective algebraic surfaces and there exists a beautiful Enriques Kodaira classification of such surfaces The research accumulated by Ramanujan Abhyankar Moh and Nagata and others has established a classification theory of open algebraic surfaces comparable to the Enriques Kodaira theory This research provides powerful methods to study the geometry and topology of open algebraic surfaces The theory of open algebraic surfaces is applicable not only to algebraic geometry but also to other fields such as commutative algebra invariant theory and singularities This book contains a comprehensive account of the theory of open algebraic surfaces as

well as several applications in particular to the study of affine surfaces Prerequisite to understanding the text is a basic background in algebraic geometry This volume is a continuation of the work presented in the author's previous publication *Algebraic Geometry* Volume 136 in the AMS series *Translations of Mathematical Monographs* *Algebraic Surfaces* Oscar Zariski, 1995-03-01

**Lectures on Curves on an Algebraic Surface** David Mumford, 2016-03-02 These lectures delivered by Professor Mumford at Harvard in 1963-1964 are devoted to a study of properties of families of algebraic curves on a non-singular projective algebraic curve defined over an algebraically closed field of arbitrary characteristic The methods and techniques of Grothendieck which have so changed the character of algebraic geometry in recent years are used systematically throughout Thus the classical material is presented from a new viewpoint *Complex Algebraic Surfaces* Arnaud Beauville, 1996-06-28 Developed over more than a century and still an active area of research today the classification of algebraic surfaces is an intricate and fascinating branch of mathematics In this book Professor Beauville gives a lucid and concise account of the subject following the strategy of F Enriques but expressed simply in the language of modern topology and sheaf theory so as to be accessible to any budding geometer This volume is self-contained and the exercises succeed both in giving the flavour of the extraordinary wealth of examples in the classical subject and in equipping the reader with most of the techniques needed for research

**Non-complete Algebraic Surfaces** Masayoshi Miyanishi, 1981 *Algebraic Geometry II* I.R. Shafarevich, 2013-11-22 This EMS volume consists of two parts The first part is devoted to the exposition of the cohomology theory of algebraic varieties The second part deals with algebraic surfaces The authors have taken pains to present the material rigorously and coherently The book contains numerous examples and insights on various topics This book will be immensely useful to mathematicians and graduate students working in algebraic geometry arithmetic algebraic geometry complex analysis and related fields The authors are well-known experts in the field and I.R. Shafarevich is also known for being the author of volume 11 of the *Encyclopaedia*

**Resolution of Singularities of Embedded Algebraic Surfaces** Shreeram Abhyankar, 1998-03-05 The common solutions of a finite number of polynomial equations in a finite number of variables constitute an algebraic variety The degrees of freedom of a moving point on the variety is the dimension of the variety A one-dimensional variety is a curve and a two-dimensional variety is a surface A three-dimensional variety may be called a solid Most points of a variety are simple points Singularities are special points or points of multiplicity greater than one Points of multiplicity two are double points points of multiplicity three are triple points and so on A nodal point of a curve is a double point where the curve crosses itself such as the alpha curve A cusp is a double point where the curve has a beak The vertex of a cone provides an example of a surface singularity A reversible change of variables gives a birational transformation of a variety Singularities of a variety may be resolved by birational transformations *Algebraic Surfaces* Lucian Silvestru Badescu, 2014-01-15

*Geometry of Low-dimensional Manifolds: Gauge theory and algebraic surfaces* S. K. Donaldson, Charles Benedict Thomas, 1990 This volume is based on lecture courses and seminars given at the LMS Durham

Symposium on the geometry of low dimensional manifolds This area has been one of intense research during the 1990s with major breakthroughs that have illuminated the way a number of different subjects interact for example topology differential and algebraic geometry and mathematical physics The workshop brought together a number of distinguished figures to give lecture courses and seminars in these subjects the volume that has resulted is the only expository source for much of the material and will be essential for all research workers in geometry and mathematical physics     Symplectic 4-Manifolds and Algebraic Surfaces Denis Auroux,Fabrizio Catanese,Marco Manetti,Gang Tian,Paul Seidel,Bernd Siebert,Ivan Smith,2008-04-17 Modern approaches to the study of symplectic 4 manifolds and algebraic surfaces combine a wide range of techniques and sources of inspiration Gauge theory symplectic geometry pseudoholomorphic curves singularity theory moduli spaces braid groups monodromy in addition to classical topology and algebraic geometry combine to make this one of the most vibrant and active areas of research in mathematics It is our hope that the five lectures of the present volume given at the C I M E Summer School held in Cetraro Italy September 2 10 2003 will be useful to people working in related areas of mathematics and will become standard references on these topics The volume is a coherent exposition of an active field of current research focusing on the introduction of new methods for the study of moduli spaces of complex structures on algebraic surfaces and for the investigation of symplectic topology in dimension 4 and higher     *Donaldson Type Invariants for Algebraic Surfaces* Takuro Mochizuki,2009-03-26 We are defining and studying an algebro geometric analogue of Donaldson invariants by using moduli spaces of semistable sheaves with arbitrary ranks on a polarized projective surface We are interested in relations among the invariants which are natural generalizations of the wall crossing formula and the Witten conjecture for classical Donaldson invariants Our goal is to obtain a weaker version of these relations by systematically using the intrinsic smoothness of moduli spaces According to the recent excellent work of L Goettsche H Nakajima and K Yoshioka the wall crossing formula for Donaldson invariants of projective surfaces can be deduced from such a weaker result in the rank two case     Theory of Algebraic Surfaces Kunihiro Kodaira,2020-09-17 This is an English translation of the book in Japanese published as the volume 20 in the series of Seminar Notes from The University of Tokyo that grew out of a course of lectures by Professor Kunihiro Kodaira in 1967 It serves as an almost self contained introduction to the theory of complex algebraic surfaces including concise proofs of Gorenstein s theorem for curves on a surface and Noether s formula for the arithmetic genus It also discusses the behavior of the pluri canonical maps of surfaces of general type as a practical application of the general theory The book is aimed at graduate students and also at anyone interested in algebraic surfaces and readers are expected to have only a basic knowledge of complex manifolds as a prerequisite     *Classification of Complex Algebraic Surfaces* Ciro Ciliberto,2020

Uncover the mysteries within is enigmatic creation, **Algebraic Surfaces** . This downloadable ebook, shrouded in suspense, is available in a PDF format ( Download in PDF: \*). Dive into a world of uncertainty and anticipation. Download now to unravel the secrets hidden within the pages.

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