
Introduction

The main purpose of this work is to classify del Pezzo surfaces with log-terminal singularities of index one or two. By classification, we understand a description of the intersection graph of all exceptional curves on an appropriate (called *right*) resolution of singularities together with the subgraph of the curves which are contracted to singular points.

The final results are similar to classical results about classification of non-singular del Pezzo surfaces and use the usual finite root systems. However, the intermediate considerations use K3 surfaces and reflection groups in hyperbolic spaces.

The work is self-contained and can also serve as an introduction to del Pezzo and K3 surfaces. It is based on our paper [AN88]. See also [AN89] for a short exposition of these results.

In this work, we *consider algebraic varieties over the field \mathbb{C} of complex numbers*, and do not mention this further.

0.1. Historical remarks and our main principle of classification of log del Pezzo surfaces of index ≤ 2

A complete algebraic surface Z with log terminal singularities is a **del Pezzo surface** if its anticanonical divisor $-K_Z$ is ample. A 2-dimensional **log terminal singularity over \mathbb{C}** is a singularity which is analytically equivalent to a quotient singularity \mathbb{C}^2/G , where $G \subset GL(2, \mathbb{C})$ is a finite subgroup. The index i of $z \in Z$ is the minimal positive integer for which the divisor iK_Z is a Cartier divisor in a neighbourhood of z .

The aim of this work is to classify del Pezzo surfaces with log terminal singularities (or simply **log del Pezzo surfaces**) of index ≤ 2 .

Log del Pezzo surfaces of index ≤ 2 include classical cases of non-singular del Pezzo surfaces and log del Pezzo surfaces of index 1, i.e.