

K3 surfaces and log del Pezzo surfaces of index three

Hisanori Ohashi (Research Institute for Mathematical Sciences)
and
Shingo Taki (Korea Institute for Advanced Study)



We want to classify log del Pezzo surfaces of index k .

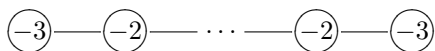
History of classification

- $k = 1$: classical result
- $k = 2$: Alexeev and Nikulin, Nakayama

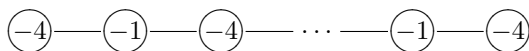
Generalize the idea of [AN] to the $k = 3$ case!

Review of [AN] ($k = 2$ case)

- Smooth Divisor Theorem
 $\exists C \in |-2K_Z|$ s.t. C : smooth curve and $C \not\ni$ singularities.
- Right resolution
In general, we get the following dual graph by the minimal resolution.



$\uparrow$: blow up at all intersection points



- Classification of non-symplectic involutions on $K3$ surfaces by Nikulin

We get a correspondence between $K3$ surfaces with a non-symplectic involution and log del Pezzo surfaces of index 2.

Main Theorem ($k = 3$ case)

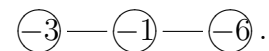
There exists a correspondence between $K3$ surfaces with a non-symplectic automorphisms of order 3 and log del Pezzo surfaces of index 3.

- Multiple Smooth Divisor Property

$\exists 2C \in |-3K_Z|$ s.t. C : smooth curve and $C \not\ni$ singularities.

- Right resolution

It is a successive union of the unit chain



- Classification of non-symplectic automorphisms of order 3 on $K3$ surfaces by Artebani and Sarti, Taki (independently)

There exists a log del Pezzo surface of index 3 which does not satisfy MSDP. (ex. $\mathbb{P}(1, 1, 3)$) Thus the observation does not give the complete classification.

Example

