

## K3 surfaces and log del Pezzo surfaces of index three

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### **Abstract**

Alexeev and Nikulin have classified log del Pezzo surfaces of index 1 and 2 by using the classification of non-symplectic involutions on K3 surfaces. We want to discuss the generalization of this result to the index 3 cases. In this case we are also able to construct log del Pezzos from K3 surfaces, but the converse is not necessarily true. The condition corresponds exactly to the "multiple smooth divisor property" for log del Pezzos, which we will define. Our theorem is the classification of log del Pezzo surfaces of index 3 with this property. The idea of the proof is similar to that of Alexeev and Nikulin, but the methods are different because of the existence of singularities. We construct and analyze special elliptic fibrations on K3 surfaces and use it to obtain the classification. It also includes a partial but geometric generalization of the classification of non-symplectic automorphisms of order three recently done by Artebani, Sarti and Taki.