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## SEMISTABLE $K3$ -SURFACES WITH ICOSAHEDRAL SYMMETRY

by Jan STEVENS \*)

**ABSTRACT.** In a Type III degeneration of  $K3$ -surfaces the dual graph of the central fibre is a triangulation of  $S^2$ . We realise the tetrahedral, octahedral, and especially the icosahedral triangulation in families of  $K3$ -surfaces, preferably with the associated symmetry groups acting.

### INTRODUCTION

A degeneration of surfaces is a 1-parameter family with general fibre a smooth complex surface. The case of  $K3$ -surfaces has attracted a great deal of attention. A nice discussion is contained in the introductory first paper [F-M] of the bundle [SAGS]. One usually allows base change and modifications to obtain good models. After a ramified cover of the base and resolution of singularities we may assume that the degeneration  $f: \mathcal{X} \rightarrow S \ni 0$  is *semistable*: the zero fibre  $X = f^{-1}(0)$  is a reduced divisor with (simple) normal crossings in the smooth manifold  $\mathcal{X}$ . Further modifications of a  $K3$ -degeneration lead to a minimal model, which falls into one of three types.

In a Type III degeneration of  $K3$ -surfaces the dual graph of the central fibre is a triangulation of  $S^2$ . In this paper I construct an example with my favourite triangulation, the icosahedral one. A substantial part is taken up by the tetrahedral case, which is easier to handle and allows more explicit results. A second purpose of this paper is to link general theory with concrete computations.

There are two obvious ways to realise a semistable degeneration with prescribed combinatorial type. The first is to start with a singular total space,

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