ERRATUM TO "GENERAL ELEPHANTS OF THREE-FOLD DIVISORIAL CONTRACTIONS"

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The classification of 3-fold divisorial contractions in [1] is incomplete in the cases (i) and (ii) below. The case (i) was pointed out by Yuki Yamamoto, and the case (ii) has been added in [2, Appendix]. Following [1], let $f\colon (Y \supset E) \to (X \ni P)$ be a 3-fold divisorial contraction whose exceptional divisor E contracts to a Gorenstein point P, and set $K_Y = f^*K_X + aE$ and $J = \{(r_Q, v_Q)\}_{Q\in I}$.

Addendum. (i) *Suppose that f is of type IIa in* [1] (= *type e1 in* [2]) *with $a = 4$. Then, besides the one described in* [1, Theorem 1.11(ii)], *f can be a contraction to a cA_2 or cD point with $r \equiv \pm 3$ modulo 8 for $J = \{(r,2)\}$.*

(ii) *Suppose that f is of type $IIb^{\vee\vee}$ in* [1] (= *type o3 in* [2]). *Then, besides those described in* [1, Theorems 1.9, 1.11(i), 1.13(i)], *f can be a contraction to a cD point described in* [2, Theorem 1.2(ii)].

Remark. The case (i) must be added to [1, Theorem 1.13] and [2, Theorem 1.3], and the case (ii) to [1, Theorem 1.8, Corollary 1.15].

The general elephant theorem [1, Theorem 1.7] remains true. Indeed, we shall prove [1, Theorem 4.4] in the case (i), and have proved [2, Theorem 4.3(ii)] in the case (ii).

The omission of the case (i) stems from an error in the proof of [1, Theorem 3.5(iii)]. The data $r \equiv \pm 3$ (8) and $(a_1,a_2,a_3) = ((r+1)/2,(r-1)/2,4)$ are true. However, $x_2^2 x_3^{(r+1)/4}$ for $r \equiv 3$ (8) and $x_1^2 x_3^{(r-1)/4}$ for $r \equiv 5$ (8) are missing in counting monomials $x_1^{s_1}x_2^{s_2}x_3^{s_3}$ with $(a_1s_1+a_2s_2+a_3s_3)/r = 2$. Thus we can not conclude $r = 5$.

Let f be a contraction with $J = \{(r,2)\}$ and $a = 4$. $E^3 = 1/r$, and Y has the unique non-Gorenstein point Q, which is a quotient singularity of type $\frac{1}{r}(1,-1,8)$. We have $f^*H_X = H+E$ for a general hyperplane section H_X on X, $Q \in C := H \cap E \simeq \mathbb{P}^1$, $r \equiv \pm 3$ (8), and $(a_1,a_2,a_3) = ((r+1)/2,(r-1)/2,4)$.

Let S be a general elephant of Y. One has $s_C(-4) = 0$ by the map $\mathscr{O}_Y(-4E)^{\otimes r} \otimes \mathscr{O}_Y(4rE) \to \mathscr{O}_C$ with $w_Q^C(8) = 4$. As in the proof of [1, Theorem 4.2(i)], one can show that $H \cap E \cap S$ is set-theoretically equal to Q. In particular, $S \sim 4H$ is smooth outside Q. By $(H\cdot E\cdot S)_Q = 4/r$, the preimages $H^\#$, $E^\#$, $S^\#$ of H, E, S on the index-one cover $Q^\# \in Y^\#$ of $Q \in Y$ have multiplicities 2, 2, 1 at $Q^\#$. Hence S has a Du Val singularity of type A_{r-1} at Q, that is [1, Theorem 4.4]. By the table in [1, p.357], $S_X = f(S)$ has a Du Val singularity of type D. Such a divisor S_X on $P \in X$ exists only if P is a cA_1, cA_2 or cD point.

REFERENCES

[1] M. Kawakita, General elephants of three-fold divisorial contractions, J. Am. Math. Soc. **16**, No. 2, 331-362 (2003)

[2] M. Kawakita, Three-fold divisorial contractions to singularities of higher indices, Duke Math. J. **130**, No. 1, 57-126 (2005)

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