

TOROIDALIZATION OF LOCALLY TOROIDAL MORPHISMS

Krishna Chaithanya Hanumanthu
Dr. Steven Dale Cutkosky, Dissertation Supervisor

ABSTRACT

Let X and Y be nonsingular varieties over an algebraically closed field k of characteristic zero. A *toroidal structure* on X is a simple normal crossing divisor D_X on X .

Suppose that D_X and D_Y are toroidal structures on X and Y respectively. A dominant morphism $f : X \rightarrow Y$ is *toroidal (with respect to the toroidal structures D_X and D_Y)* if for all closed points $p \in X$, f is isomorphic to a toric morphism of toric varieties specified by the toric charts at p and $f(p)$.

A dominant morphism $f : X \rightarrow Y$ of nonsingular varieties is *toroidalizable* if there exist sequences of blow ups with nonsingular centers $\pi : Y_1 \rightarrow Y$ and $\pi_1 : X_1 \rightarrow X$ so that the induced map $f_1 : X_1 \rightarrow Y_1$ is toroidal.

Let $f : X \rightarrow Y$ be a dominant morphism. Suppose that there exist finite open covers $\{U_i\}$ and $\{V_i\}$ of X and Y respectively such that $f(U_i) \subset V_i$ and the restricted morphisms $f : U_i \rightarrow V_i$ are toroidal for all i . f is then called *locally toroidal*.

It is proved that a locally toroidal morphism from an arbitrary variety to a surface is toroidalizable.