64. *Logarithmic Deformations of Holomorphic Maps and Equisingular Displacements of Surfaces with Ordinary Singularities*[*)]

By Kimio MIYAJIMA and Shōji TSUBOI
Department of Mathematics, Kagoshima University

(Communicated by Kunihiko KODAIRA, M. J. A., June 15, 1982)

Introduction. In this paper we shall give a definition of logarithmic deformations of holomorphic maps and prove the existence of the semi-universal family. If the map we consider is non-degenerate, this family turns out to be universal. The concept of logarithmic deformations of holomorphic maps is stimulated by Y. Kawamata's paper [3].

As a by-product we shall obtain another proof of the existence of the universal family of equisingular displacements of surfaces with ordinary singularities, which has been already proved by M. Namba [6]. Following Y. Kawamata, we use the terminology "equisingular" in the sense that they admit a simultaneous *embedded* resolution. Our result cannot cover K. Kodaira's existence theorem [4]. However, in case that the ambient threefold W satisfies the condition $H^2(W, \mathcal{O}_W)=0$, our theorem includes it.

Our method is expected to be useful for the proof of the higher dimensional analogue of the equisingular displacements of complex spaces with "ordinary singularities".

§ 1. Logarithmic deformations of holomorphic maps. Let X be a compact complex manifold, C an analytic subset of X of simple normal crossing, and f a holomorphic map of X into a complex manifold Y.

Definition 1. By a family of logarithmic deformations of (X, C, f), we mean a 6-tuple $(\mathcal{X}, \mathcal{C}, \Phi, \pi, o, T)$ satisfying the following:

(1) $(\mathcal{X}_o, \mathcal{C}_o, \Phi_o)=(X, C, f)$ and $o \in T$,

(2) $(\mathcal{X}-\mathcal{C}, \mathcal{X}, \mathcal{C}, \pi, o, T)$ is a family of logarithmic deformations of $(X-C, X, C)$ (cf. [3]),

(3) $(\mathcal{X}, \Phi, \pi, T)$ is a family of holomorphic maps into Y (cf. [5]).

We define the concepts of equivalence and completeness of families of logarithmic deformations of holomorphic maps into Y as in [3] and [5].

*) This research was partially supported by Grant-in-Aid for Scientific Research (No. 564029), Ministry of Education.