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The Seifert matrices of Milnor fiberings defined by holomorphic functions

By Koichi SAKAMOTO

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§ 1. Introduction.

A "spinnable structure" defined by I. Tamura is a generalization of the structure of a Milnor fibering [4] for a holomorphic function at an isolated critical point. M. Kato [2] has shown that there is a one to one correspondence of "simple spinnable structures" on S^{2n+1} ($n \geqq 3$) with congruence classes of unimodular matrices via Seifert matrices.

The purpose of this paper is to prove "Join theorem" about the Seifert matrices of Milnor fiberings at isolated critical points. As a corollary, we calculate the Seifert matrices of the Milnor fiberings of the Brieskorn polynomials. Essentially, we make use of the facts obtained in [5].

DEFINITION 1. A *spinnable structure* on a closed manifold M is a triple $\mathcal{S}=\{F, h, g\}$: F is a compact manifold, $h: F \to F$ is a diffeomorphism such that $h \mid \partial F = \mathrm{id}$, and $g: T(F, h) \to M$ is a diffeomorphism, where $T(F, h)$ is a closed manifold obtained from $F \times [0, 1]$ by identifying $(x, 1)$ with $(h(x), 0)$ for all $x \in F$ and (x, t) with (x, t') for all $x \in \partial F$ and $t, t' \in [0, 1]$. When F is a handlebody obtained from a ball by attaching handles of index $\leqq \left[\frac{\dim M}{2}\right]$, $\mathcal{S}$ is called a *simple spinnable structure.*

DEFINITION 2. A closed oriented $(2n+1)$-manifold is an *Alexander manifold,* if $H_n M = H_{n+1} M = 0$.

If $\mathcal{S}=\{F, h, g\}$ is a simple spinnable structure on an Alexander manifold M^{2n+1}, then $H_n F$ is torsion free.

DEFINITION 3. Let $\mathcal{S}=\{F, h, g\}$ be a simple spinnable structure on M^{2n+1}. For a basis $\alpha_1, \cdots, \alpha_m$ of $\tilde{H}_n(F)$, a matrix $\Gamma(\mathcal{S}) = (L(g_{\#}(\alpha_i \times 0), g_{\#}(\alpha_j \times 1/2)))$ is called a *Seifert matrix* of $\mathcal{S}$, where $L(\xi, \eta)=$ the linking number of ξ and η in $M^{2n+1}=$ intersection number $\langle \lambda, \eta \rangle$. ($\lambda$ is a chain in M such that $\partial \lambda = \xi$.)

THEOREM 1 (M. Kato [2]). *There is a one to one correspondence of isomorphism classes of simple spinnable structures on a* 1-*connected Alexander* $(2n+1)$-*manifold* M *with congruence classes of unimodular matrices via Seifert matrices, provided that* $n \geqq 3$.