29. *Deforming Twist Spun 2-Bridge Knots of Genus One*

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(Communicated by Kôsaku YOSIDA, M. J. A., April 12, 1988)

We work in the *PL* category. Zeeman's k-twist spin of an n-knot K, $k\neq 0$, is a fibered $(n+1)$-knot with fiber punctured k-fold branched cyclic cover of S^{n+2} branched over K [11]. Combining an untwisted deformation of an n-knot with k-twist spinning, $k\neq 0$, Litherland [4] constructed a new fibered $(n+1)$-knot; especially he identified the fiber of an l-roll k-twist spun knot. A 2-bridge knot of genus one $C(2m, 2n)$ has a period q of order 2, that is, rotation q of S^3 with period 2 and axis J which leaves $C(2m, 2n)$ invariant. See Fig. 1, where m (resp. n) denotes the number of half twists, right handed if $m>0$ (resp. $n<0$), left if $m<0$ (resp. $n>0$); $C(4, 6)$ in illustration. Making use of this period, we can construct a deforming twist spun 2-knot. We visualize the fiber (theorem), using the surgery technique by Rolfsen [8]. From this we have:

Corollary. *There exists a fibered* 2*-knot in* S^4 *whose fiber is a punctured Seifert manifold with invariant* $(b; (2,1), (2,1), (2,1))$, $b=1, 4$, *that is, a prism manifold* [6] *with fundamental group* $Q\times Z_{|2b+3|}$, *where* Q *is the quaternion group of order* 8.

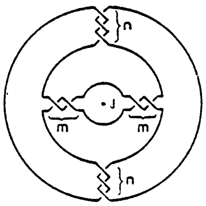

Fig. 1

Hillman [1] determined all the 2-knot groups with finite commutator subgroups. Yoshikawa [10] realized them as twist spun knots in S^4 except in the case when the commutator subgroup is $Q\times Z_m$, m (>1) is odd, when any twist spun knot cannot realize [2, Chapter 5] and Yoshikawa only got a fibered 2-knot in a homotopy 4-sphere. Morichi [5] realized an embedding of every punctured prism manifold in S^4. Plotnick and Suciu [7] determined all the fibered 2-knots in a homotopy 4-sphere with fiber a punctured spherical space form; it is not known weather all of them, including the above case, can be realized as fibered 2-knots in S^4.

Construction of a fibered 2-knot. The circle S^1 is taken to be the quotient space either

$$R/\theta\sim\theta+1 \qquad \text{for all } \theta\in R, \text{ or } I/0\sim 1,$$