REIDEMEISTER TORSION AND LENS SURGERIES ON $(-2, m, n)$-PRETZEL KNOTS

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(Joint work with YUICHI YAMADA)

We define the *Reidemeister torsion* following V. G. Turaev. Any homology lens space is obtained by p/q-surgery along a knot in a homology 3-sphere Σ, where $|p| \geq 2$ and $q \neq 0$. We denote it by $\Sigma(K; p/q)$. We call a homology lens space $\Sigma(K; p/q)$ is *of lens type* if its Reidemeister torsions are equal to those of a lens space. Let $P(-2, m, n)$ be the $(-2, m, n)$-pretzel knot in S^3, where m and n are odd numbers with $m, n \geq 3$, and $\Delta_{m,n}(t)$ the Alexander polynomial of $P(-2, m, n)$. We study a knot in a homology 3-sphere whose Alexander polynomial is $\Delta_{m,n}(t)$ by using Reidemeister torsion. Then we obtained the following three theorems:

Theorem 1 *Let K be a knot in a homology 3-sphere Σ whose Alexander polynomial is $\Delta_{m,n}(t)$. Then*

(1) *If $\Sigma(K; p/q)$ is of lens type and p is divisible by 2, then $\{m, n\} = \{3, 5\}$ or $\{3, 7\}$.*

(2) *If $\Sigma(K; p/q)$ is of lens type and p is divisible by 4, then $\{m, n\} = \{3, 5\}$.*

Theorem 2 *Let K be a knot in a homology 3-sphere Σ whose Alexander polynomial is $\Delta_{3,n}(t)$ ($n \geq 7$ and n is odd). Then*

(1) *If $\Sigma(K; (2n+4)/q)$ is of lens type, then $n = 7$ and $q \equiv \pm 1 \pmod{2n+4}$.*

(2) *If $\Sigma(K; (2n+5)/q)$ is of lens type, then $n = 7$ and $q \equiv \pm 1 \pmod{2n+5}$.*

Theorem 3 *If $\Sigma(K; p/q)$ is of lens type, then the Reidemeister torsion of $\Sigma(K; p/q)$ is the same as that of $L(p, qi^2)$.*

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