Plans of my research

In Dae JONG

The trapezoidal conjecture for Alexander polynomials of alternating links due to R. H. Fox is still open. There is another problem which is the converse of the trapezoidal conjecture. i.e. Is there a alternating knot which possesses a given polynomial as its Alexander polynomial? The solution of these problems may derive the characterisation of alternating knots.

The trueness of the trapezoidal conjecture for special alternating knots of genus one and two is obtained. I study the trapezoidal conjecture for non-special alternating knots of genus two as the next plan. In this study, I use the method which was used in special alternating case, the argument of the first coefficient of Conway polynomial is equal to the linking number of two component links, and the method which is obtained by applying the matrix-tree theorem to the Alexander matrix constructed from Wirtinger group presentation of the alternating diagram.

The trapezoidal conjecture do not set a limit on the jump of the coefficients. Next conjecture set a limit on the jump of the coefficients which include trapezoidal one. The claim is that Alexander polynomial of a alternating link meet following conditions.

- $c_i = c_{m-i}$ for $i = 0, 1, \ldots, m$.
- $0 < c_0 \leq c_1 \leq \cdots \leq c_{[\frac{m}{2}]}$.
- $c_{j-1} \cdot c_{j+1} \leq {c_j}^2$ for $j = 1, \ldots, [\frac{m}{2}] - 1$.

I study the converse problem of trapezoidal conjecture when this conjecture is turned out true. In this study I use the method of monocyclic state-sum.

R. I. Hartley proved that the trapezoidal conjecture is true for two bridge links as written "Summary of my research". The method of monocyclic state-sum may be applied to two bridge links. Because if K is a two bridge Link, then the degree of $\Delta_K(t)$ and the genus of K denoted by d and $g(K)$ respectively, meet $d = 2g(K)$. If I obtain another proof of the trapezoidal conjecture for two bridge links, then I study other knots case which meet $d = 2g(K)$.