ON THE z-DEGREE OF THE KAUFFMAN POLYNOMIALS VIA A TANGLE DECOMPOSITION

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In 1987, M.E. Kidwell produced an upper bound on the degree of the Dubrovnik polynomial $D_L(\lambda, z)$ in terms of the crossing number and the length of the longest bridge in a link diagram. Indeed, $\max\deg_z D_L(\lambda, z) \leq c(D) - b(D)$, where D is a diagram of a link L with $c(D)$ crossings and $b(D)$ is the length of a longest bridge in D.

It is natural to ask the following question;

Question. *How the maximal z-degree of $D_L(\lambda, z)$ is affected by a set of bridges $B_1, \cdots, B_n$ in a link diagram D?*

It is trivial that if D is a connected sum of $D_1, D_2, \cdots, D_n$ and if $b(D_i)$ is the length of a longest bridge in D_i, then $\max\deg_z D_D(\lambda, z) \leq \sum_{i=1}^{n}(c(D_i) - b(D_i))$, where $c(D_i)$ denote the number of crossings in D_i.

In 2001, Kidwell and Stanford showed the following which is a partial solution of the question:

Proposition 1. *Let D be a link diagram written as a wiring diagram with n 4-tangles $\{T_i\}_{i=1}^{n}$. Let $c(T_i)$ be the number of crossings in T_i and $b(T_i)$ the length of a longest bridge in T_i.*

$$\max\deg_z D_D(\lambda, z) \leq \sum_{i=1}^{n}(c(T_i) - b(T_i)) + (n-1).$$

In this talk, we will generalize the results of Kidwell and Stanford for *any* tangles.

Theorem 2. *Let D be a link diagram written as a wiring diagram with n $2k_i$-tangles $\{T_i\}_{i=1}^{n}$. Let $c(T_i)$ be the number of crossings in T_i and $b(T_i)$ the length of a longest bridge in T_i. Then*

$$\max\deg_z D_D(\lambda, z)(x) \leq \sum_{i=1}^{n}(c(T_i) - b(T_i)) + \sum_{i=2}^{n}\frac{k_i(k_i-1)}{2}.$$

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