

# The relation between Milnor $\bar{\mu}$ -invariant and HOMFLYPT polynomial for links

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**Abstract.** This is joint work with Akira Yasuhara (Tokyo Gakugei University). For an ordered, oriented link in the 3-sphere, J. Milnor defined a family of invariants, known as Milnor  $\bar{\mu}$ -invariants. For an  $n$ -component link, Milnor invariant is specified by a sequence of elements of  $\{1, 2, \dots, n\}$  and the length of the sequence is called the length of the Milnor invariant. J.-B. Meilhan and A. Yasuhara showed that any Milnor  $\bar{\mu}$ -invariant of length between 3 and  $2k + 1$  can be represented as a combination of HOMFLYPT polynomial of knots obtained by certain band sum of the link components, if all  $\bar{\mu}$ -invariants of length  $\leq k$  vanish. In this talk, we improve their formula to give the  $\bar{\mu}$ -invariants of length  $2k + 2$  by adding correction terms. The correction terms can be given by a combination of HOMFLYPT polynomial of knots determined by  $\bar{\mu}$ -invariants of length  $k + 1$ . In particular, for any 4-component link the  $\bar{\mu}$ -invariants of length 4 are given by our formula, since all  $\bar{\mu}$ -invariants of length 1 vanish.