Young Mathematicians Conference 2021
The Ohio State University, August 20-22, 2021

A Twisted Thistlethwaite Theorem

Joseph D Paugh (paugh.30@osu.edu)
The Ohio State University [Mentor:Sergei Chmutov]

Abstract of Report Talk: Elegantly connecting knot theory and graph theory, Thistlethwaite's celebrated 1987 theorem constructs a planar graph from an alternating link diagram, producing a correspondence between the Jones polynomial of knot theory and the Tutte polynomial of graph theory. The Jones polynomial was later generalized to an invariant of virtual links - the arrow polynomial - in a 2009 paper of Dye and Kauffman, useful for its applications in bounding the virtual crossing number. Then in 2012, an analogue of Thistlethwaite's theorem for the arrow polynomial was produced by Chmutov et al, obtained by constructing a ribbon graph (a representation of a graph embedding) from a virtual link diagram. In particular, the result takes a generalized Tutte polynomial for ribbon graphs - the arrow dichromatic polynomial - and specializes it to the arrow polynomial of a virtual link diagram. In the same spirit, our research group developed a ribbon graph construction for twisted links: abstract link diagrams embedded in potentially non-orientable surfaces. The result is a Thistlethwaite-type theorem for twisted links, directly generalizing the result of Chmutov et al by relating the arrow dichromatic polynomial to the arrow polynomial of a twisted link diagram. **[PJ04205147]**

[Joint with Justin Wu, Gavin Zhang]

Received: August 17, 2021