

## Virtual links and a multi-variable polynomial invariant

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In this talk, we construct a multi-variable polynomial invariant for virtual knots and links via the concept of a decorated virtual magnetic graph diagram. Such a diagram is proposed by Ishii to reformulate the Alexander-Conway polynomial for classical knots and links as a state summation by a smoothing decomposition. Ishii's technique provides a good approach to the method of constructing the invariant of this talk. The invariant is based on the bracket polynomial for virtual knots and links by Kauffman. An additional idea, which is the concept of an oriented vertex, leads to the polynomial in multiple variables. The invariant can be reduced to the Jones-Kauffman polynomial or the 2-variable polynomial introduced by the speaker by a suitable change of variables. The invariant is useful for the theory of virtual knots and links. It can be used to show that a virtual knot or link, which can not be detected by the Jones-Kauffman polynomial, is not classical. It may be also used to evaluate the virtual crossing number of a virtual knot or link. We give such examples and some features of the invariant in this talk.

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