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Concordance invariants of virtual knots

Virtual knot theory concerns knots in thickened surfaces, and Turaev defined virtual concordance and non-classical concordance invariants for them. This talk is based on joint work with Micah Chrisman and Robin Gaudreau aimed at extending classical concordance invariants to the virtual setting. One of the obstacles to this program is the absence of Seifert surfaces from the virtual toolkit, and so we focus our attention on AC knots, which is the subclass of virtual knots with homologically trivial representatives. So a virtual knot is AC iff it admits a Seifert surface, in particular every classical knot is AC. Our first result is that stable Manturov projection gives a map from virtual knots to AC knots that preserves concordance. Consequently any concordance invariant defined for AC knots lifts to all virtual knots. We show how to construct virtual Seifert surfaces directly from the AC diagrams, and we also show how to slice virtual knots directly from their Gauss diagrams. Using virtual Seifert surfaces, we define the usual package of invariants, including Alexander-Conway polynomials, signatures, and twisted signatures, and we show how they often (but not always) give rise to concordance invariants of virtual knots. These invariants are applied to study sliceness of low crossing AC knots. In general, the twisted signatures will depend on the choice of Seifert surface, but less so in the untwisted case. This is established by computing the knot signatures in terms of checkerboard surfaces and Goeritz matrices à la Gordon-Litherland.