

A TOPOLOGICAL MODEL FOR THE COLOURED JONES POLYNOMIALS

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In 1991, Reshetikhin and Turaev defined a method that starts with a quantum group and leads to link invariants. This construction is purely algebraic and combinatorial. The coloured Jones polynomials $J_N(L, q)$ are a family of quantum invariants constructed with this method from the representation theory of $U_q(sl(2))$. The first invariant of this sequence $J_2(L, q)$ is the original Jones polynomial. This is a quantum invariant but it has the feature that it is characterised by skein relations. For higher coloured Jones polynomials there are no easy skein relations to use.

In 1990, Lawrence introduced a sequence of representations of the braid groups, using the homology of a certain covering of a configuration space. After that, Lawrence and Bigelow gave a homological model for the original Jones polynomial. They used the skein nature of the invariant for the proof.

We give a topological model for all coloured Jones polynomials. We use their definition as quantum invariants and the Lawrence representations as a homological tool. We prove that $J_N(L, q)$ can be described as a graded intersection pairing between two homology classes on a covering of the configuration space of the punctured disc.

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