On homological representations of motion groups

Martin Palmer-Anghel   ∥   Talk at the Geometry and Topology seminar at the University of Glasgow

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Abstract.

We will describe a general construction of *homological representations* for families of *motion groups* or *mapping class groups*, including the families of braid groups, surface braid groups, loop braid groups and automorphism groups of free groups. This recovers the well-known constructions of Lawrence-Bigelow and of Long-Moody for the classical braid groups, and in this sense it unifies these constructions.

The construction is moreover "global" in the sense that, for each dimension d, it is a functor on a category whose automorphism groups are all d-dimensional motion groups and mapping class groups, and which also carries a richer structure. Using this richer structure, we will discuss *polynomiality* of these families of representations, and use this to prove twisted homological stability for the braid groups B_n with coefficients in any one of the Lawrence-Bigelow representations.

We will also discuss *indecomposability* and *irreducibility* of these representations. In particular, the m-th Lawrence-Bigelow representation of B_n is indecomposable. On the other hand (if one takes coefficients in the ring of formal Laurent series instead of Laurent polynomials), for $m \geqslant 2$, the m-th Lawrence-Bigelow representation of B_n contains its own dual as a proper subrepresentation.

This represents two instances of joint work, one with Cristina Anghel and one with Arthur Soulié.