Rezazadegan, Reza
Seidel-Smith cohomology for tangles. (English) [Zbl 1187.53086]

In [Duke Math. J. 134, No. 3, 453–514 (2006; Zbl 1108.57011)], P. Seidel and I. Smith defined a singly graded link cohomology based on symplectic geometry which they called “symplectic Khovanov homology”. They conjectured that this invariant equaled Khovanov homology after the collapse of the bigrading. They defined a family \( \{Y_n\}_{n \in \mathbb{N}} \) of symplectic manifolds and to each braid \( \beta \in Br_{2m} \) they assigned a symplectomorphism \( h_\beta \) of \( Y_m \). The Seidel-Smith invariant of a link \( K \) is the Floer cohomology of \( L \) and \( h_\beta(L) \), where \( L \) is a specific Lagrangian submanifold of \( Y_m \) and \( \beta \) is any braid representation of \( K \).

In the paper under review the author constructs a generalization of the Seidel-Smith invariant to even tangles. To any elementary \((i,j)\)-tangle \( T \) he assigns a Lagrangian correspondence \( L_T \) between \( Y_i \) and \( Y_j \). Any \((m,n)\)-tangle \( T \) can be decomposed into a composition of elementary ones \( T = T_kT_{k-1} \cdots T_1 \). Moreover let \( \Phi(T) = (L_{T_k}, L_{T_{k-1}}, \ldots, L_{T_1}) \) denotes generalized Lagrangian correspondence between \( Y_m \) and \( Y_n \). Then it is proved, that up to isomorphism of generalized correspondence, \( \Phi(T) \) is independent of the decomposition of \( T \) into elementary tangles. In this way the author obtains two invariants for each \((m,n)\)-tangle \( T \). The first one is a functor \( \Phi^# \) from the generalized Fukaya category of \( Y_m \) to that of \( Y_n \). The second one is a graded abelian group, denoted \( Kh_{symp}(T) \), which is, roughly, the Floer cohomology of \( \Phi(T) \). The second main result of the paper says that \( Kh_{symp}(T) \) is well-defined and is independent of the decomposition of \( T \) into elementary tangles. The paper contains many references/accordances to Khovanov homology.

Reviewer: Andrzej Szczepański (Gdańsk)

MSC:
53D40 Symplectic aspects of Floer homology and cohomology
57M27 Invariants of knots and 3-manifolds (MSC2010)
57R58 Floer homology
20F36 Braid groups; Artin groups
14D05 Structure of families (Picard-Lefschetz, monodromy, etc.)
14D06 Fibrations, degenerations in algebraic geometry

Keywords:
tangles; link invariant; Khovanov homology; Lagrangian; Floer homology

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References:

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