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Wall-crossings and a categorification of K-theory stable bases of the Springer resolution.
(English) Zbl 1478.19006

The authors consider the stable envelopes in K-theory for the cotangent space of the generalized full flag variety G/B, where G is a reductive linear group. The stable envelope consists of elements in the torus-equivariant K-theory associated to the attracting sets of the fixed points. The stable envelopes depend on the additional data: the Weyl chamber and the slope. The main result of the paper describes what is the result of moving the slope. The basic modification of this data is to change the slope crossing the wall of the Weyl alcove. Changing the Weyl chamber is easier to describe.

The paper heavily relies on the Okounkov-Smirnov paper [A. Okounkov and A. Smirnov, “Quantum difference equation for Nakajima varieties”, Preprint, arXiv:1602.09007], where the stable envelopes were introduced and studied, see also [A. Okounkov, Proc. Symp. Pure Math. 97, 419-457 (2018; Zbl 1451.14162)]. A general shape of the formula is given in [A. Okounkov and A. Smirnov, “Quantum difference equation for Nakajima varieties”, Preprint, arXiv:1602.09007], and here the formula is made precise. Further the authors extend the single wall-crossing transformation into an action of an affine Hecke algebra. The same algebra acts on the derived category of sheaves on T∗G/B. It is noticed that both action agree and the K-theoretic stable envelope consists of classes of certain objects living in the derived category. Further, since the construction of the Hecke action can be lifted to the objects defined over integers and reduced modulo a prime number, the theory remains valid over finite characteristic field. The part of the paper dealing with the derived category is based on the results of R. Bezrukavnikov et al. [Nagoya Math. J. 184, 1–55 (2006; Zbl 1125.17006); Ann. Math. (2) 167, No. 3, 945–991 (2008; Zbl 1220.17009); Ann. Math. (2) 178, No. 3, 835–919 (2013; Zbl 1293.17021)].

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MSC:
19L47 Equivariant K-theory
20C08 Hecke algebras and their representations
14M15 Grassmannians, Schubert varieties, flag manifolds
17B50 Modular Lie (super)algebras
14F08 Derived categories of sheaves, dg categories, and related constructions in algebraic geometry

Keywords:
stable basis; Springer resolution; Hecke algebra; Verma module; wall-crossing

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Riche, S., Geometric braid group action on derived categories of coherent sheaves, Represent. Theory 12 (2008), 131-169. · Zbl 1156.14014


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