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The cohomology rings of regular Hessenberg varieties

Hessenberg varieties form a distinguished class of subvarieties in the flag variety, and their study is central to themes at the interface of combinatorics, geometric representation theory, and symplectic geometry. Such themes include the Stanley–Stembridge and Shareshian–Wachs conjectures, in which the cohomology rings of Hessenberg varieties feature prominently.

I will provide an invariant-theoretic description of the cohomology rings of regular Hessenberg varieties, emphasizing the roles played by Tymoczko's dot action, the Grothendieck–Springer resolution, Deligne's local invariant cycle theorem, and topological monodromy. Our results build upon those of Brosnan–Chow, Abe–Harada–Horiguchi–Masuda, and Abe–Horiguchi–Masuda–Murai–Sato.

This represents joint work with Ana Balibanu.