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A Gröbner basis for regular nilpotent Hessenberg Schubert cells

Hessenberg varieties lie at the intersection of algebraic geometry, combinatorics, and topology. A trend in the last decade has been to study Hessenberg varieties via their local defining ideals, called patch ideals. Recently, Da Silva and Harada showed that in the regular nilpotent case, the patch ideal of the longest word permutation w_0 is a particularly nice complete intersection, which they called a triangular complete intersection.

In this talk, we will define triangular complete intersections and discuss several nice applications, including to Hilbert series and Gröbner bases. We will also show how Da Silva and Harada's w_0-patch results translate to arbitrary patches for the local defining ideals of intersections of regular nilpotent Hessenberg varieties with Schubert cells. This translation preserves triangular complete intersections and we recover Tymoczko's result—in type A—that regular nilpotent Hessenberg varieties are paved by affines.

This is based on work with Sergio Da Silva, Megumi Harada, and Jenna Rajchgot.