

Frank Sottile: Galois groups of Schubert problems

In 1870 Jordan explained how Galois theory can be applied to problems from enumerative geometry, with the group encoding the intrinsic structure of the problem. Earlier Hermite showed the equivalence of Galois groups with geometric monodromy groups, and in 1979 Harris initiated the modern study of Galois groups of enumerative problems. While difficult to determine in general, several methods have been developed recently to partially determine Galois groups in the Schubert calculus.

I will describe this background and discuss a project that seeks to determine Galois groups of all Schubert problems of moderate size, investigating millions of problems. This project combines theoretical results with supercomputers employing several overlapping methods, including combinatorics, symbolic computation, and numerical homotopy continuation. It is driving the development of new algorithms and software, and a partial classification is emerging from this study.