On the Chevalley conjecture and related projectivity criteria

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Abstract

The Chevalley conjecture stated in 1958 has given rise to numerous results concerning projectivity of algebraic varieties. We will give a detailed survey on this topic beginning with the half century old Kleiman-Chevalley projectivity criterion and finishing with the theorem proved this year by Benoist, which proves the conjecture in its most general form. We will explain the connection between the Picard number, the Chevalley number and the cardinality of the set of maximal quasiprojective open subsets of a variety. In particular we will give constructions of varieties which show the necessity of various assumptions in the theorems mentioned above. We will improve the assumption on the inequality between the Picard and Chevalley numbers in the classical Kleiman-Chevalley criterion and show that it is almost the best possible.