

Abstract

Building on the developments of many people including Evans, Greene, Katz, McCarthy, Ono, and Rodriguez-Villegas, we consider period functions for hypergeometric type algebraic varieties over finite fields and consequently study hypergeometric functions over finite fields in a manner that is parallel to that of the classical hypergeometric functions. Using a comparison between the classical gamma function and its finite field analogue the Gauss sum, we give a systematic way to obtain certain types of hypergeometric transformation and evaluation formulas over finite fields and interpret them geometrically using a Galois representation perspective. As an application, we obtain a few finite field analogues of algebraic hypergeometric identities, quadratic and higher transformation formulas, and evaluation formulas. We further apply these finite field formulas to compute the number of rational points of certain hypergeometric varieties.