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Support varieties and holomorphic differentials

Suppose X is a smooth projective curve over an algebraically closed field k on which a finite group G acts faithfully over k . It is a classical problem to describe the kG -module structure of the holomorphic differentials $H^0(X, \Omega_X^1)$. When the characteristic of k is a prime number p that divides $\#G$, this problem is much more difficult. I will discuss how one can use support varieties to study this problem. In particular, I will show that the non-maximal support variety of $H^0(X, \Omega_X^1)$ is contained in a union of projective spaces associated to the inertia subgroups of the action of G on X .