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Counting characters in blocks of solvable groups with abelian defect group

If G is a solvable group and p is a prime, then the Fong-Swan theorem shows that given any irreducible Brauer character φ of G, there exists a character $\chi \in \mathrm{Irr}(G)$ such that $\chi^o = \varphi$, where ^{o} denotes the restriction of χ to the p-regular elements of G. We say that χ is a *lift* of φ in this case. It is known that if φ is in a block with abelian defect group D, then the number of lifts of φ is bounded above by $|D|$. In this paper we give a necessary and sufficient condition for this bound to be achieved, in terms of local information in a subgroup V determined by the block B. We also apply these methods to examine the situation when equality occurs in the $k(B)$ conjecture for blocks of solvable groups with abelian defect group.

This is joint work with J. P. Cossey.