Clifford Theory and Conjectures on Brauer Character Degrees

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Abstract. In 2005 and 2007, Holm and Willems suggest two conjectures about Brauer character Degrees: One is in globe form:

$$|G|_{p'} \leq \sum_{\varphi \in Br(G)} \varphi(1)^2$$

Another is in local or block form:

$$\frac{DIM_F B}{|D|} l(B) \leq \sum_{\varphi \in Br(G)} \varphi(1)^2$$

In this talk, we apply Clifford theory to prove the conjectures in the following cases:
1) the block B covers a block b of a normal subgroup N with $l(b) = 1$ and $|D_B| \leq N$; 2)there exists a normal p solvable subgroup N and $D_B \leq N$. Our results cover two true cases proved by Holm and Willems: $l(B) = 1$ or G is p-solvable. Furthermore, we give an affirmative answer to their problem about Cartan matrix in our cases.