

On a conjecture of E. Rapaport Strasser about knot-like groups and its pro- p version

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A group G is knot-like if it is finitely presented of deficiency 1 and has abelianization $G/G' \simeq \mathbb{Z}$. We prove the conjecture of E. Rapaport Strasser that if a knot-like group G has a finitely generated commutator subgroup G' then G' should be free. The proof of Rapaport's Conjecture is a corollary of a much more general result : if G is a discrete group of geometric dimension n with a finite $K(G, 1)$ -complex Y of dimension n , Y has Euler characteristic 0, N is a normal subgroup of G containing the commutator subgroup G' and N is of homological type FP_{n-1} then N is of homological type FP_n and hence G/N has finite virtual cohomological dimension $vcd(G/N) = cd(G) - cd(N)$. In particular either N has finite index in G or $cd(N) \leq cd(G) - 1$.

Furthermore we show a pro- p version of the above result with the weaker assumption that G/N is a pro- p group of finite rank. Consequently a pro- p version of Rapaport's Conjecture holds.

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