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ON GENERALIZATIONS OF SYLOW TOWER GROUPS

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In this paper two different generalizations of Sylow tower groups are studied. In Chapter I the notion of a k-tower group is introduced and a bound on the nilpotence length (Fitting height) of an arbitrary finite solvable group is found. In the same chapter a different proof to a theorem of Baer is given; and the list of all minimal-not-Sylow tower groups is obtained.

Further results are obtained on a different generalization of Sylow tower groups, called Generalized Sylow Tower Groups (GSTG) by J. Derr. It is shown that the class of all GSTG's of a fixed complexion form a saturated formation, and a structure theorem for all such groups is given.

NOTATIONS

The following notations will be used throughont this paper:

$N \lhd G$	N is a normal subgroup of G
$N \operatorname{Char} G$	N is a characteristic subgroup of G
$N \cdot\!\lhd G$	N is a minimal normal subgroup of G
$M < G$	M is a proper subgroup of G
$M <\cdot G$	M is a maximal subgroup of G
$Z(G)$	the center of G
$\lvert G \rvert_p$	p-part of the order of G, p a prime
$\pi(G)$	set of all prime divisors of $\lvert G \rvert$
$\phi(G)$	the Frattini subgroup of $G =$ the intersection of all maximal subgroups of G
$[H]K$	semi-direct product of H by K
$F(G)$	the Fitting subgroup of $G =$ the maximal normal nilpotent subgroup of G
$C(H) = C_G(H)$	the centralizer of H in G
$N(H) = N_G(H)$	the normalizer of H in G
$P \in \mathrm{Syl}_p(G)$	P is a Sylow p-subgroup of G
P is a S_p-subgroup of G	$P \in \mathrm{Syl}_p(G)$
$\mathrm{Core}\,(H) = \mathrm{Core}_G(H)$	the largest normal subgroup of G contained in $H = \bigcap_{g \in G} H^g$
$l(G)$	the nilpotence length (Fitting height) of G
$l_p(G)$	p-length of G
$d(G)$	minimal number of generators of G
$c(P)$	nilpotence class of the p-group P
p^*	some nonnegative power of prime p
$O_p(G)$	largest normal p-subgroup of G