Jaromír Duda

# Mal'cev conditions for congruence-regular and congruence-permutable varieties

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## ANNOUNCEMENTS OF NEW RESULTS

### MAL´CEV CONDITIONS FOR CONGRUENCE-REGULAR AND CONGRUENCE-PERMUTABLE VARIETIES

Jaromír Duda (Vysoké učení technické v Brně, 60200 Brno, Československo),received 20.8.1979

Notions. For any algebra $\mathfrak{A}=\langle A,F\rangle$, an element $a\in A$ and a relation R on A, the subset $\{x\in A; (a,x)\in R\}$ is called a class of R. $\mathfrak{A}$ is called congruence-regular, tolerance regular, reflexive and compatible-regular if any two congruences, tolerances, reflexive and compatible relations on $\mathfrak{A}$, respectively, coincide whenever they have a class in common.

Remark. Recently, I. Chajda has given Mal´cev conditions for varieties of (i) congruence-regular and congruence-permutable algebras (see [1]); (ii) tolerance-regular algebras (see [2]).

We state that these two classes of varieties coincide and some other Mal´cev conditions hold.

Theorem. For any variety V the following conditions are equivalent:

(1) V is congruence-regular and congruence-permutable;
(2) V is tolerance-regular;
(3) V is reflexive and compatible-regular;
(4) There exist a (2n+3)-ary polynomial t and ternary polynomials $p_i$ $(i=1,\dots,n)$ such that $x=t(x,y,z,z,\dots,z,$
$p_1(x,y,z),\dots,p_n(x,y,z))$ $y=t(x,y,z,p_1(x,y,z),\dots$
$\dots,p_n(x,y,z),z,\dots,z)$ $z=p_1(x,x,z)=\dots=p_n(x,x,z)$;
(5) There exist a (n+3)-ary polynomial r and ternary polynomials $p_i$ $(i=1,\dots,n)$ such that $x=r(x,y,z,z,\dots,z)$
$y=r(x,y,z,p_1(x,y,z),\dots,p_n(x,y,z))$ $z=p_1(x,x,z)=\dots=$
$=p_n(x,x,z)$.

References. [1] I. Chajda, Regularity and permutability of congruences, to appear in Algebra Univ. 9(1979).
[2] I. Chajda, A Mal´cev characterization of tolerance regularity, to appear in Acta Sci. Math.(Szeged)