

Invariants and Local Moduli of Singularities in Positive  
Characteristic.

GERT-MARTIN GREUEL \*

**Abstract**

We study singularities  $f \in K[[x_1, \dots, x_n]]$  over an algebraically closed field  $K$  of arbitrary characteristic with respect to right and contact equivalence. We establish improved bounds for the degree of determinacy in positive characteristic. Moreover, we consider different non-degeneracy conditions of Kouchnirenko, Wall and Beelen-Pellikaan in positive characteristic, and we show that Newton non-degenerate singularities satisfy Milnor's famous formula  $\mu = 2\delta - r + 1$  (which in general is wrong if  $\text{char}(K) > 0$ ).

Furthermore we study piecewise filtrations induced by the Newton polytope of  $f$ . In the 1970s Arnold introduced the condition (A), slightly weakened by Wall in 1999, which allows to compute a normal form of a power series  $f$  over the complex numbers with respect to right equivalence. We generalise Arnold's and Wall's results to arbitrary characteristic and introduce a new condition (AC) for contact equivalence which replaces condition (A). Thus we deduce normal forms and new determinacy bounds for hypersurface singularities with respect to right and contact equivalence.

---

\*joint work with Y. Boubakri and T. Markwig.