

## ASYMPTOTIC EXPANSIONS AND SUMMABILITY WITH RESPECT TO AN ANALYTIC GERM

JORGE MOZO FERNÁNDEZ AND REINHARD SCHÄFKE

**Abstract:** In a previous article [CMS], monomial asymptotic expansions, Gevrey asymptotic expansions, and monomial summability were introduced and applied to certain systems of singularly perturbed differential equations. In the present work, we extend this concept, introducing (Gevrey) asymptotic expansions and summability with respect to a germ of an analytic function in several variables – this includes polynomials. The reduction theory of singularities of curves and monomialization of germs of analytic functions are crucial to establish properties of the new notions, for example a generalization of the Ramis–Sibuya theorem for the existence of Gevrey asymptotic expansions. Two examples of singular differential equations are presented for which the formal solutions are shown to be summable with respect to a polynomial: one ordinary and one partial differential equation.

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**Key words:** Asymptotic expansions, summability.