

**THE SMALL DIVISORS PHENOMENON IN THE
PROBLEM OF CONVERGENCE OF FORMAL
SOLUTIONS TO q -DIFFERENCE EQUATIONS**

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ABSTRACT. A sufficient condition for the convergence of a generalized formal power series solution to an algebraic q -difference equation is provided. The result uses a geometric property related to the semi-group of (complex) power exponents of such a series. This semi-group is finitely generated and there are two different situations depending on whether its generators are placed in some open half-plane in \mathbb{C} or not. In the second situation the small divisors phenomenon arises and the study of convergence of generalized formal power series solutions to an algebraic q -difference equation resembles the study of the problem of linearization of diffeomorphisms of $(\mathbb{C}^n, 0)$.