

Abstract

The main topics of this dissertation are Gevrey estimates and summability of formal solutions for certain classes of moment partial differential equations, with linear equations with variable coefficients being the subject of our interest.

Our first step is to describe all the tools used in the summability theory, mainly the kernel and moment functions as well as Borel and Laplace transforms. Next, our focus shifts towards formal power series and asymptotic expansions of holomorphic functions and their various properties. In particular, we present Watson's Lemma, which guarantees the uniqueness of an asymptotic power series of a given Gevrey order in wide sectors.

In the main part of the dissertation we focus on finding the Gevrey estimates for moment partial differential equations with variable coefficients. When they are only time-dependent, we use formal norms that have been developed for this case. After that we move on to more general equations with variable coefficients and achieve analogous results using a modified version of Nagumo norms. Next, using all the tools mentioned before, we focus on the problem of summability for a generalized heat equation and then for a more generic linear equation with coefficients that do not depend on the time variable.