SEMINARIO

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On parametric asymptotic expansions and confluence for Banach valued solutions to some singularly perturbed nonlinear q-difference-differential Cauchy problem

Abstract: We investigate a singularly perturbed q-difference differential Cauchy problem with polynomial coefficients in complex time and space that involves a quadratic nonlinearity. We construct local holomorphic solutions on sectors in the complex plane with respect to the perturbation parameter with values in some Banach space of formal power series with analytic coefficients on shrinking domains in time. Two aspects of these solutions are addressed. One feature concerns asymptotic expansions in the perturbation parameter for which a Gevrey type structure is unveiled. The other fact deals with confluence properties as q tends to 1. In particular, the built up Banach valued solutions are shown to merge in norm to a fully bounded holomorphic map in all its arguments that solves a nonlinear partial differential Cauchy problem.

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