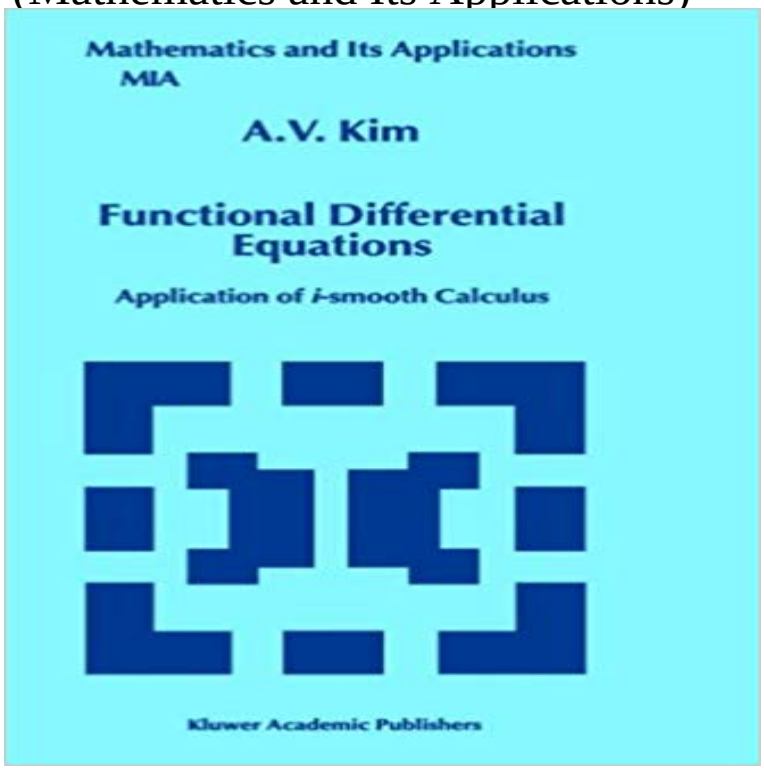
# Functional Differential Equations: Application of i-smooth calculus (Mathematics and Its Applications)




Beginning with the works of N.N.Krasovskii [81, 82, 83], which clari fied the functional nature of systems with delays, the functional approach provides a foundation for a complete theory of differential equations with delays. Based on the functional approach, different aspects of time-delay system theory have been developed with almost the same completeness as the corresponding field of ODE (ordinary differential equations) the ory. The term functional differential equations (FDE) is used as a syn onym for systems with delays 1. The systematic presentation of these re sults and further references can be found in a number of excellent books [2, 15, 22, 32, 34, 38, 41, 45, 50, 52, 77, 78, 81, 93, 102, 128]. In this monograph we present basic facts of i-smooth calculus ~ a new differential calculus of nonlinear functionals, based on the notion of the invariant derivative, and some of its applications to the qualitative theory of functional differential equations. Utilization of the new calculus is the main distinction of this book from other books devoted to FDE theory. Two other distinguishing features of the volume are the following: - the central concept that we use is the separation of finite dimensional and infinite dimensional components in the structures of FDE and functionals; - we use the conditional representation of functional differential equa tions, which is convenient for application of methods and constructions of i~smooth calculus to FDE theory.

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