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Nonstandard finite difference method and its application

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A model of a physical system corresponds to the construction of an approximate mathematical representation of the system, incorporating certain important and essential features of the system, while ignoring everything else. We consider the dicretization of the Cauchy problem for the ordinary differential equation. Our aim is construct such discrete models which result in convergent numerical solutions, and the discrete solutions preserve the main qualitaive properties of the solution of the continuous model. In our talk we introduce the nonstandard finite difference method (NSFD) and investigate its consistency and convergence. We also consider the qualitative propeties of this method. We show that this combined method does not only preserve the consistency order and convergence of the base ERK method but also have many other good features: it is both absolute stable and unconditionally nonnegativity preserving. We demonstrate our theoretical results on the extended Ross model for malaria propagation.