Bern-Fribourg Graduate Seminar

a seminar for Master and PhD students

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Room B6, Exakte Wissenschaften, Bern

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Splitting methods and their application to semilinear parabolic problems with non-periodic boundary conditions

Abstract

Splitting schemes are a natural approach to integrate numerically in time differential equations. However, high order splitting methods suffer in general from an order reduction phenomena when applied to the time integration of partial differential equations with non-periodic boundary conditions. In the last decade, there were introduced several modifications to prevent the second order Strang Splitting method from such a phenomena. In this talk, inspired by these recent corrector techniques, we introduce a splitting method of order three for a class of semilinear parabolic problems that avoids order reduction in the context of non-periodic boundary conditions. We discuss the third order convergence of the method in a simplified linear setting and confirm the result by numerical experiments. Moreover, we observe numerically that the high order convergence persists for an order four variant of a splitting method, and also for a nonlinear source term.