

# Superconvergence of the Strang splitting when using the Crank-Nicolson scheme for parabolic PDEs with oblique boundary conditions

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We show that the Strang splitting method applied to a diffusion-reaction equation with inhomogeneous general oblique boundary conditions is of order two when the diffusion equation is solved with the Crank-Nicolson method, while order reduction occurs in general if using other Runge-Kutta schemes or even the exact flow itself for the diffusion part. We also show that this method recovers stationary states in contrast with splitting methods in general. We prove these results when the source term only depends on the space variable. Numerical experiments suggest that the second order convergence persists with general nonlinearities.

**Auteurs principaux:** Prof. BESSE, Christophe (Institut de Mathématiques de Toulouse, U.M.R CNRS 5219, Université de Toulouse, CNRS, UPS IMT); Prof. VILMART, Gilles (Université de Genève); BERTOLI, Guillaume (Université de Genève)

**Orateur:** BERTOLI, Guillaume (Université de Genève)

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