A fully discretized domain decomposition approach for semi-linear SPDEs

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We consider a fully discretized numerical scheme for parabolic stochastic partial differential equations with additive or multiplicative noise. Our method is based on a non-iterative domain decomposition approach. Such methods can help parallelize the code and therefore lead to a more efficient implementation.

The domain decomposition is integrated through an operator splitting approach, where one operator acts on one part of the domain. More precisely, we combine the implicit Euler method with the Douglas-Rachford splitting scheme. For an efficient space discretization of the underlying equation, we chose the discontinuous Galerkin method. For this fully discretized scheme, we provide a strong space-time convergence result.

In the presentation, the numerical method will be explained, together with a short outline of the convergence proof. We conclude the presentation with numerical experiments validating our results.

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