Waveform Relaxation Methods for Stochastic Differential Equations

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ABSTRACT: L^p-convergence of waveform relaxation methods (WRMs) for numerical solving of systems of ordinary stochastic differential equations (SDEs) is studied. For this purpose, we convert the problem to an operator equation $X = \mathbb{T}X + G$ in a Banach space $\mathcal{E}$ of $\mathcal{F}_t$-adapted random elements describing the initial- or boundary value problem related to SDEs with weakly coupled, Lipschitz-continuous subsystems. The main convergence result of WRMs for SDEs depends on the spectral radius of a matrix associated to a decomposition of $\mathbb{T}$. A generalization to one-sided Lipschitz continuous coefficients and a discussion on the example of singularly perturbed SDEs complete this paper.

Key words. waveform relaxation methods, stochastic differential equations, stochastic-numerical methods, iteration methods, large scale systems