1154-65-1965 **Joshua Lee Padgett*** (joshua.padgett@ttu.edu), Broadway and Boston, Lubbock, TX 79416.
A nonlinear splitting algorithm for preserving asymptotic features of stochastic singular differential equations.

In this talk we present a nonlinear splitting algorithm for approximating stochastic singular differential equations. In particular, we focus on problems whose singularities induce finite-time blow-up of either the solution, or its derivative, with respect to the expectation of the given norm. The proposed splitting algorithm allows for the careful handling of the singular and stochastic parts, separately. We also develop an adaptive time-stepping algorithm, based on the self-similarity of the true solution of the underlying system, which guarantees that the numerical approximation captures the asymptotic features of the problem—such as blow-up rates and blow-up time. Moreover, we provide convergence and stability results for the general abstract setting (which includes finite difference, finite element, and spectral discretizations of the spatial differential operators), demonstrating the robustness of the proposed algorithm. If time permits, we will briefly mention how the proposed method can be generalized to derive methods of arbitrarily high order. Numerical experiments will be provided to verify the theoretical results. (Received September 16, 2019)