

Monotone SPDEs with Algebraic Constraints

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This talk is about a new stochastic framework for solving energy networks arising in circuit simulation and gas transport. Particular foci are the uncertainties caused by fluctuations in demand and supply. Neglecting these uncertainties, the transient behavior of such networks can be described by systems of partial differential equations (e.g. the Euler equations for gas networks) coupled via algebraic constraints. Here, we study an approach using a semi-explicit prototype for the coupling of algebraic equations with an SDE and an SPDE. We take a look at existing theory and extend this to our prototype to get existence and uniqueness under specific assumptions. Considering energy networks, we discuss how restrictive these assumptions are by taking a closer look at circuit simulation and gas transport in this stochastic setting.