

RA-1: Mathematical Analysis and Multiscale Formulation of SPDEs

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Model I:

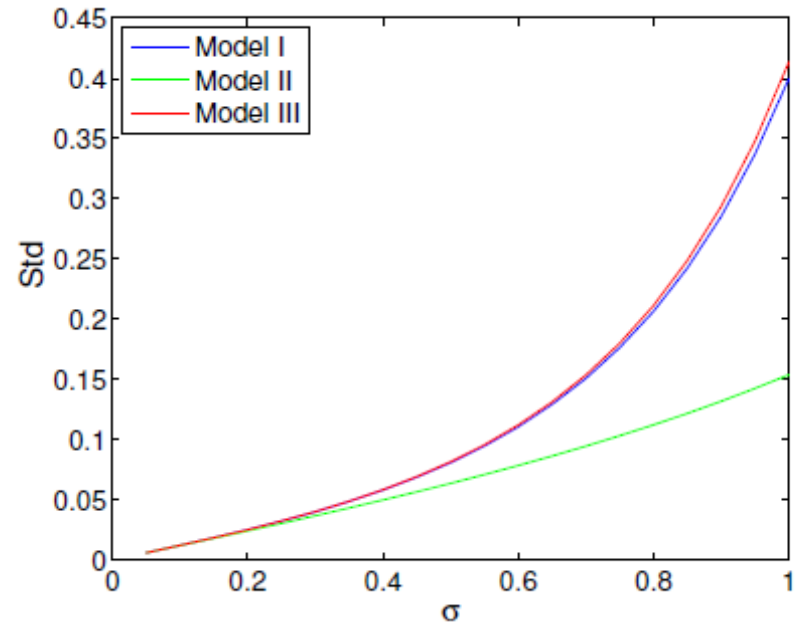
$$-\nabla \cdot (a(\mathbf{x}, \omega) \cdot \nabla u(\mathbf{x}, \omega)) = f(\mathbf{x})$$

Model II:

$$-\nabla \cdot (a(\mathbf{x}, \omega) \diamond \nabla u(\mathbf{x}, \omega)) = f(\mathbf{x})$$

Model III:

$$-\nabla \cdot \left((a^{-1}(\mathbf{x}, \omega))^{\diamond(-1)} \diamond \nabla u(\mathbf{x}, \omega) \right) = f(\mathbf{x})$$



- *New Theory: Malliavin Div-Operator & Stochastic Convolution*
[Wan, Rozovsky & Karniadakis, PNAS, Aug 2009](#)