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Parabolic PDEs with random coefficients on moving hypersurfaces

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Motivation

- Diffusion of particles on moving fluctuating lipid membranes

Surface PDEs: modelling of processes which take place on membranes

UQ: uncertainty of input parameters, randomness of the evolution

- Random advection-diffusion equation on a moving hypersurface

$$\partial^\bullet u - \nabla_\Gamma \cdot (\alpha(\omega) \nabla_\Gamma u) + u \nabla_\Gamma \cdot \mathbf{w} = f$$

- Analysis: uniform and log-normal coefficient
  existence and uniqueness of the solution

- Numerics: Evolving Surface FEM and
  Monte-Carlo
- Example: Evolving ellipsoid