

# Applications of Stochastic Fractional Partial Differential Equations

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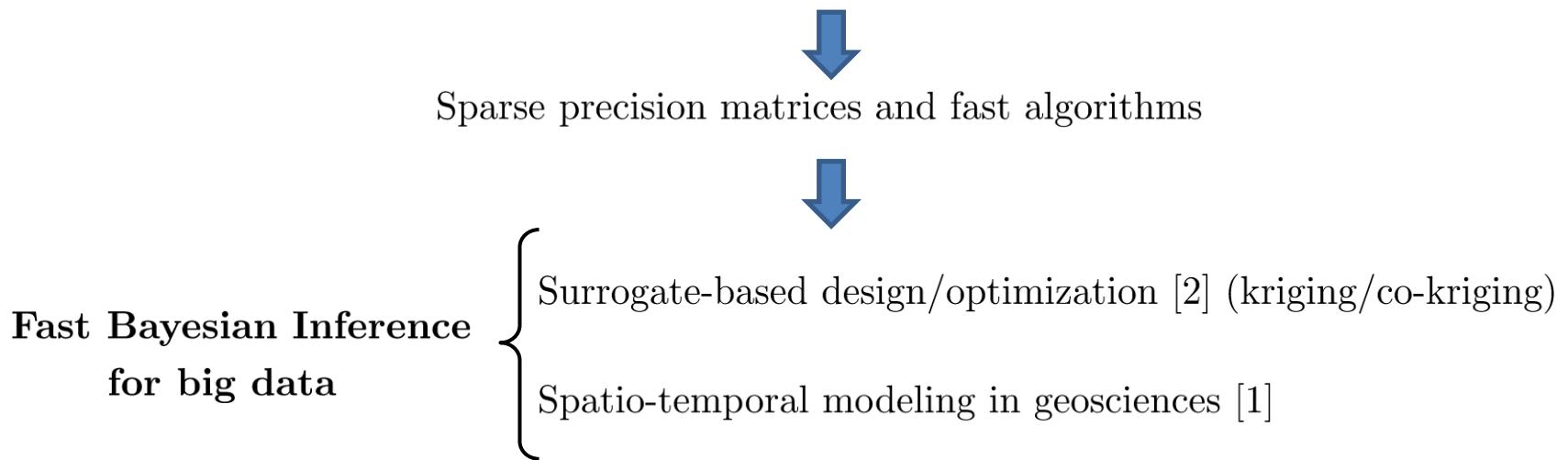
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The solution to certain types of fractional SPDEs, e.g.,

$$(\kappa^2 - \nabla^2)^{\alpha/2} u(\mathbf{x}; \omega) = \dot{W}(\mathbf{x}; \omega) \quad \alpha = 1, 2, \dots$$

can be well approximated by Gaussian Markov Random Fields (GMRF) [1]



[1] F. Lindgren, H. Rue and J. Lindström, “An explicit link between Gaussian fields and Gaussian Markov random fields: the stochastic partial differential equation approach”, *J. Roy. Stat. Soc. B*, 2011, **73** (4), pp. 423-498.

[2] A. I.J Forrester, A. Sóbester and A. J. Keane, “Multi-fidelity optimization via surrogate modelling” *Proc. R. Soc. A*, 2006, **463**, doi: 10.1098/rspa.2007.1900.