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Monte Carlo methods for Fredholm integral equations

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Fredholm integral equations of the first kind are the prototypical example of inverse ill-posed problem. They model, among other things, density deconvolution, image reconstruction and find applications in epidemiology, medical imaging, nonlinear regression settings.

However, their numerical solution remains a challenging problem. Many techniques currently available require a preliminary discretisation of the domain of the solution or make strong assumptions about its regularity.

In this talk I will introduce a novel Monte Carlo method that circumvents these two issues and performs an adaptive stochastic discretisation of the domain without requiring strong assumptions on the solution of the integral equation.

This method enjoys good theoretical properties and provides state-of-the-art performance for realistic systems.

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