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Title: « Bayesian inference of non-uniform loss timescales of the transient radial diffusion system »

Abstract:
Plasma densities in the Earth's radiation belt have been modelled using the classical radial diffusion PDE. Although this simplified linear equation has proven to be an indispensable tool in understanding the dynamics of the radiation belt, it requires specification of unknown quantities such as the diffusion field and electron loss timescales. Since these quantities are never directly observed in the in-situ data, researchers have so far assumed an a priori structure for them and tried to find approximate values of their parameters using satellite data. The state of the art in this domain lacks a coherent expression of this problem in a probabilistic paradigm.

We will present some recent progress made by the CWI-Inria associated team MDG-TAO in performing Bayesian inference of radial diffusion parameters. We achieve this by making extensive use of theory around Gaussian Processes and linear operator equations and show how one may perform Markov Chain Monte Carlo sampling of radial diffusion parameters.