

An optimization method for the ITER Radial X-ray Camera line-of-sight design using on Bayesian uncertainty analysis

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This paper presents a novel uncertainty optimization algorithm for the design of line-of-sight (LOS) systems used in tomographic inversion. By extending Gaussian process tomography from discrete pixel space to continuous function space through Bayesian inference, we introduce an uncertainty function and analyse its typical distributions. We develop an algorithm to minimize the uncertainty, which is then applied to optimize the LOS configuration of the internal camera in the ITER project. Uncertainty analysis and phantom testing are conducted to validate the effectiveness of the proposed algorithm. The results demonstrate improved accuracy and stability in tomographic reconstructions. This study contributes to the advancement of LOS design for tomographic inversion, offering a practical solution for optimizing diagnostic systems in complex experimental settings.

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