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Tomotok: python package for tomography of tokamak plasma radiation

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A python package, called Tomotok, focused on performing tomographic inversion of tokamak plasma radiation is developed at the Institute of Plasma Physics of the Czech Academy of Sciences. It aims to provide multiple inversion algorithms with an easy to use interface. It is planned to publish this software as open source in the near future, in order to enable and ease performing tomographic inversion on different devices worldwide.

In this contribution, the package structure allowing an easy implementation of various tokamak and diagnostic geometries is described. Tomotok also includes tools to build geometry matrices that describe the view of detectors using single line of sight approximation and that serve as an input of the inversion algorithms. Last, auxiliary functions that can prepare simple artificial data (hollow or gaussian profiles…) and their use to test the performances of the algorithms are shown.

The implemented inversion methods are Minimum Fisher Regularisation [1], Biorthogonal Decomposition [2,3] and Linear Algebraic Methods [4]. The implementation of each method is explained in detail and example results obtained by inverting phantom models are presented and discussed. Results of experimental data inversions are shown for selected methods. The execution speed of all algorithms was benchmarked and is compared.

References

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