

Tomographic Reconstruction of Radiation Distribution with Impurity Injection in the GOLEM Tokamak Plasma Using Fast Visible Cameras

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Impurities play a considerable role in plasma radiation distribution and material migration in the fusion reactor plasma. Therefore, plasma radiation provides valuable information on the impurity transport in fusion plasmas [1]. Tomography inversion is a method to determine the radiation distribution function by using line integrated plasma projections data [2]. Various diagnostic systems such as fast visible radiation matrix cameras are applied to capture the projection data in high temperature plasma studies.

The present work focuses on tomographic reconstruction of the plasma radiation distribution in presence of impurity injection in the GOLEM tokamak of the Czech Technical University in Prague using the Tomotok package [3]. For this purpose, the radiation caught by two crossed monochrome visible cameras (radial and vertical) with a frame rate of 40,000 fps (1280 × 56 pixels) is used for reconstruction. In addition, the radiation of injected impurities is shown by plasma spectroscopy measurements.

References:

- [1] D Mazon et al 2012, Review of Scientific Instruments 83.6, p. 063505.
- [2] Jan Mlynar et al 2010, Fusion Science and Technology 58.3, 733–741.
- [3] S Abbasi et al 2023, Fusion Engineering and Design 193, 113647.