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**Local three-dimensional tokamak plasma tomography using nonlinear weight matrix**<sup>1</sup> SEUNG HUN LEE, JUNGHEE KIM, W. CHOE, Korea Advanced Institute of Science and Technology — Compared to the two-dimensional tomography which covers only one poloidal cross-section of the toroidal plasma, three-dimensional tomography in toroidal geometry is quite complicated because of the curved feature and the geometrical limitation. We introduce the Jacobian matrix in evaluating weight matrix for better performance of the three-dimensional tomography in the curved geometry. The Jacobian matrix executes coordinate transformation from the rectangular to the curved vector space. In this work, we performed tomographic tests with the coordinate transformation and the nonlinear weight matrix. The poloidal cross-section is divided into 35x25 pixels and 18 toroidal layers are considered in the reconstruction region. We chose the emissivity phantoms which were combined with the simulated equilibrium flux surfaces and the MHD modes. How to extract the MHD modes from the reconstructed result will be described. The reconstruction algorithm is based on the modified Phillips-Tikhonov regularization method.

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