Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

Local 3-D Toroidal Plasma Tomography Using the Phillips-Tikhonov Regularization Method SEUNG HUN LEE, JUNGHEE KIM, WONHO CHOE, KAIST Dep. of Physics, GAS DISCHARGE PHYSICS LAB TEAM — Tomography is one of a powerful diagnostic method for obtaining the local information from the line-integrated plasma emission in fusion devices. The 3-D tomography is a complicated task compared to the 2-D tomography. Because of the limitation of the spatial distribution of the array detectors around a torus, the regularization algorithm such as the Phillips-Tikhonov method is advantageous to achieve more reliable reconstruction. In this work, we performed a feasibility study of 3-D tomography for toroidal plasmas. Four tangentially-viewing array detectors of each array consisting of 16x16 detector elements were assumed to be implemented. The reconstruction area is configured as 70 cm x 50 cm of poloidal cross-section and 40 toroidal layers, which has spatial resolution of 5 cm. We chose the phantoms which are KSTAR plasma-like profiles combined with the equilibrium flux surfaces with n = 0, 1, 2, 3 modes. The change of the emission peak in each layer in the reconstruction result agrees reasonably well with that of the phantom, with relative error of 5 - 10 %.

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Date submitted: 22 Jul 2008 Electronic form version 1.4