Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Initial design of the soft x-ray tomographic diagnostic array system for KSTAR plasmas W. CHOE, JUNGHEE KIM, SEUNG HUN LEE, J.K. RHEE, Department of Physics, Korea Advanced Institute of Science and Technology, 373-1 Guseong-dong, Yuseong-gu, Daejeon 305-701, Korea — A soft x-ray (SXR) tomographic array system is a powerful diagnostic tool for observing inner structure and various physical activities of tokamak plasmas. The SXR diagnostic system for KSTAR is based on the six photodiode detector arrays arranged in a poloidal plane with total of 192 detector channels. The newly developed fast MEM (maximum entropy method) combined with SVD (singular value decomposition) was applied to the tomography test with KSTAR-like emission phantoms. The spatial setup of the components was optimized by geometrical calculation and ray-tracing for accurate SXR analyses. The radiation-resistive AXUV-16ELG detector array was chosen for surviving high dose of radiation during the long pulse operation in KSTAR, and the high-speed ($\sim$600 kHz) in-vacuum preamplifier with high gain ($\sim 10^5$) was developed and tested to observe high speed MHD activities. The spatial optimization of the detector in each array will be adjusted by the miniaturized remote motion-control system, which consists of a small in-vacuum motor and a controllable PXI module. Moreover, in order to maintain the performance of the detector, a controllable thermo-electric cooler and a shutter will be mounted on the array for long-pulse experiments on KSTAR.

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Date submitted: 24 Aug 2005 Electronic form version 1.4