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### 8.15 Synthetic Diagnostic for Electron Cyclotron Emission Imaging

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#### Abstract

Synthetic diagnostics are aimed at simulating the responses of diagnostic systems under real experimental scenarios and are the key to drawing quantitative inferences from experimental data. The synthetic ECEI diagnostic is suitable to evaluate the improvement arising from the application of Field Curvature Adjustment (FCA) lenses in the design of the upgraded EAST ECEI system. Previously, a curved image plane is inevitable in the optics system with only convex lenses, which leads to stronger crosstalk between vertically adjacent channels and strongly limits the vertical channel resolution of the imaging system. The synthetic ECEI diagnostic results show that, with FCA lenses applied, the upgraded ECEI system has significant advantages to focus on high poloidal wavenumber structures with the aberrations from the spherical surfaces corrected and the various artifacts related to the field curvature suppressed. Also, the synthetic ECEI diagnostics is used for some quantitative calculations to partially decouple the effect of density fluctuations and temperature fluctuations for a given plasma. *Work supported by U.S. DOE Grant FG02-99ER54531


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