Analysis of Tangential Camera Views of Tokamak Plasmas[1] W.H.
MEYER, M.E. FENSTERMACHER, LLNL, M. GROTH, Aalto University — Commercial digital video cameras are increasingly being employed as sensor and digitizer
for fusion plasma diagnostics. Here we describe some of our recent work to significantly improve tomographic analysis of tangential viewing camera data in toroidal
geometry. Fiducial images obtained during vents are used to produce direct linear
transformation matrices for each diagnostic camera and determine an accurate camera position and viewport. A tokamak solid model for rendering is used between
vents to check camera alignment or when hardware fiducial images are unavailable.
The rendering provides camera pixel distance of integration, vessel impact position,
and angle of incidence. Reflection characterization is also performed using this solid
model. After determining the camera geometry parameters, a response matrix is
calculated for toroidally symmetric solution grids. We apply standard sparse linear
solvers to the back projection problem for filtered visible light cameras. Forward
projections are utilized for theory code validation and visualization. Poloidal IR
profiles are extracted from tangential viewing IR camera data using surface parameters determined from solid model rendering. We present examples of each of these
applications.

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