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Quantitative simulation and density reconstruction in high-energy X-ray radiograph LI TANG, HAIBO XU, National Key Laboratory of Computational Physics, Institute of Applied Physics and Computational Mathematics, Beijing 100088, China — Numerical radiograph using Monte Carlo method is used to study fidelity of density reconstruction in high-energy X-ray radiography. A density reconstruction method for a polyenergetic X-ray source and an object composed of different materials is proposed. The method includes energy spectrum, angular spectrum and spot size of photon source. And it includes mass absorption coefficients explicitly in density reconstruction as well. A constrained conjugate gradient algorithm and variation regularization are applied to determine material edges and density reconstruction of a French test object. It shows that the method is valid for density reconstruction and energy spectrum of imaging photons is important in obtaining accurate material densities in high-energy X-ray radiograph.

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