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8.23 Forward weight matrix derivation through Monte-Carlo ray-tracing of KSTAR IRVB

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The infrared imaging video bolometer (IRVB) as a foil bolometry technique can be an alternative solution to the conventional resistive bolometer since it has a great advantage in its stability against electromagnetic noise compared with resistive bolometers using a Wheatstone Bridge. As for the data analysis of the IRVB, the plasma 2D radiation profile is not directly converted from the foil image of the IRVB due to the pixel number difference and the line averaged nature of the measurement. However, the forward weight matrix constructing the foil image from the radiation from the plasma can be easily derived through the geometric structure of the system, and the reconstruction process from the foil image to the plasma radiation profile is directly based on the forward weight matrix. So, the precise construction of the forward weight matrix should be an important work. Here we present the way of the forward weight matrix derivation through Monte-Carlo ray-tracing. Compared with the conventional forward weight matrix constructions with only chief rays, this method can provide the most rigorous and precise forward weight matrix since it uses all possible rays at each segment of the foil.

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