INVERSE ESTIMATION OF RADIATIVE SOURCE TERM IN TWO-DIMENSIONAL IRREGULAR MEDIA

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ABSTRACT.   An inverse radiation analysis is presented for estimation of the source term distribution in irregular two-dimensional absorbing-emitting media from the knowledge of the exit radiation intensities at boundary surfaces. A modified discrete transfer method is used to solve the radiative transfer equation. The inverse problem is formulated as an optimization problem that minimizes the errors between the exit radiation intensities calculated and the experimental data. The conjugate gradient method is used for minimization of an objective function, which is expressed by the sum of square residuals between estimated and measured exit radiation intensities. The effects of the measurement errors and optical thickness on the accuracy of the inverse analysis are investigated. The results show that the source term distribution over the internal nodes can be estimated accurately, even with noisy data. However, the estimation of source term over the boundary nodes are more sensitive to the measurement errors.