THE DRESOR METHOD FOR RADIATIVE HEAT TRANSFER IN A SEMITRANSPARENT GRADIENT INDEX CYLINDRICAL MEDIUM

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ABSTRACT. During a numerical analysis of radiative transfer in some cylindrical industrial furnaces, applying a cylindrical coordinate system would be much more convenient and precise than that using a Cartesian coordinate system. In this paper, the DRESOR method under a cylindrical coordinate system is proposed to address radiative transfer in a semitransparent gradient index cylindrical medium. The dimensionless incident radiation and net radiative heat flux are obtained using the DRESOR method. The accuracy and validity of the proposed method is verified by comparison with other techniques. The effects of isotropic scattering albedo and gradient index on radiative transfer also are considered. Additionally, the high directional radiative intensity information is obtained to show the performance of the DRESOR method. It shows that the DRESOR method is an effective technique to address the radiative transfer problem in the gradient index cylindrical medium with complex surface temperature characteristics.