PERFORMANCE ANALYSIS MODEL FOR A NEAR-FIELD THERMOPHOTOVOLTAIC SYSTEM WITH A BACKSIDE REFLECTOR

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ABSTRACT. The present work provides a semi-analytic method to conduct performance analysis of a near-field thermophotovoltaic (TPV) system with a backside reflector. For calculating the power output of the near-field TPV system, continuity equation for the diffusion of minority carrier should be solved. Finite difference method is often employed to solve the equation but its long calculation time hampers the optimization of the system. Here, we propose an approximate semi-analytical solution which can be used to get power output of the near-field TPV system with the backside reflector in significantly reduced calculation time. It was found that the proposed method can reproduce the power output of the near-field TPV system with the backside reflector with error less than 4% compared to finite difference model prediction.