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# **Semi-analytical simulation for temperature of material irradiated by CW laser considering the effect of atmospheric thermal blooming**

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## **Abstract**

In this paper, the temperature of material irradiated by continuous wave (CW) laser considering the effect of atmospheric thermal blooming is simulated and analyzed. By using the analytical solution of the atmosphere thermal blooming for axial symmetry, the heat conduction model of CW laser irradiating surface of material after the atmosphere thermal blooming is established. Separation of variables is used to solve the heat conduction equation and its semi-analytical solution is obtained. We studied the effect of laser propagation distance and the intensity of undistorted laser beam on the thermal blooming, and on the temperature distribution of the material. The results show that the greater the laser propagation distance in the atmosphere, the more obvious the effect of the thermal blooming, which leads to the greater distortion of the temperature distribution of the material.

**Keywords:** Thermal blooming; Laser irradiation; Temperature; Semi-analytical solution

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