

## Thermal Radiation Modelling Method for Turbine Blades Using Quartz Lamp Array

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**Abstract :** With the continuous development of aviation engine technology, the turbine inlet temperature under a high thrust-to-weight ratio is constantly increasing. The thermal radiation effect brought by this has become a key influencing factor in engine thermal protection design. Due to the omnidirectionality, non-gray character, and coupling property of thermal radiation, it is difficult to realize the comprehensive cooling efficiency matching of hot-end components under the total heat flow considering wall radiation and convective heat transfer in low operating condition simulation experiment, which causes thermal radiation factors to be often overlooked. For the simulation and testing of the turbine guide vanes' comprehensive cooling characteristics, this paper proposes a radiative experiment simulation method, distinctively using quartz lamp arrays as the form of radiative energy flow loading, realizing the full coupling heat transfer characteristics experiment involving convection, radiation, and heat conduction of turbine blades under low operating condition. To a certain extent, it verifies the feasibility of the method. Meanwhile, the influence characteristics of radiation power and radiation heat flux distribution on the cooling characteristics of turbine guide vanes were studied through experiments. It provides an important reference for the turbine in the aspect of guide blades experiment simulation method and thermal design.

**Keywords :** thermal radiation, turbine guide vane, quartz lamp, experimental study

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