

Classification of Jet Impingement Solar Collectors – A Recent Development in Solar Energy Technology

ABSTRACT

Jet impingement mechanism has been extensively studied in previous research due to its ability to enhance the efficiency of a solar collector. The photovoltaic module temperature can be effectively lowered while preserving the temperature uniformity and enhancing the solar collector performance. Since jet impingement offers such a broad application, numerous studies have focused on its heat transfer characteristic. This article provides a comprehensive review of recent jet impingement solar collectors. Additionally, the design and performance of the jet impingement cooling methods on solar air collectors, photovoltaic and photovoltaic thermal systems are discussed. The comprehensive review is classified into four main components involving jet impingement in solar collector applications: single pass, double pass, concentrated and jet configuration. A critical review is discussed at the end of each classification. The nozzle streamwise and spanwise pitch, nozzle to target spacing, nozzle diameter, nozzle shape, and Reynold number significantly impact the heat transfer properties of jet impingement. Research on applying single pass-single ducts using jet impingement is still lacking and needs further research. Thermally, a double pass solar collector outperforms a single pass-solar collector due to the absorber plate's high heat extraction rate and more significant interaction caused by the doubled heat transfer surface.