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## Effects of partial shading on energy and exergy efficiencies for photovoltaic panels

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### Abstract

Photovoltaic (PV) technology becomes very popular with development of material science among the indispensable of solar energy in recent years. In this paper is investigated the electrical performance and thermodynamics analysis under the shading shapes and shading ratios of photovoltaics panels which have in 75 W power. The operating and electrical parameters of a photovoltaic panel are including cell temperature, overall heat loss coefficient, fill factor, etc. With this aim, an experimental set-up was constructed and serial experiments were done for different parameters such as shading ratio and positions. Three different cases of shading effects as cell, horizontal and vertical shading at different percentage. The results showed that the values of fill factor are also determined for the systems and effect of fill factor on the efficiencies is also evaluated. The shading makes important effect on energy and exergy efficiencies of the system and the most important effect is formed in case of horizontal shading. The maximum power loss was occurred at the shading rate 100% as 69.92% in cellular, 66.93% in vertical, 99.98% in horizontal shading.

**Keywords:** Photovoltaic, partial shading, energy, exergy, maximum power point (MPP)

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