Daylighting systems photovoltaic

The importance of aperture and lighting controls in the effectiveness of a daylighting system is highlighted, along with the financial advantages of incorporating daylighting into building design. Luminescent solar concentrators and planar micro-optic solar concentrators are also discussed.

IEA SHC Task 61 / EBC Annex 77 "Integrated Solutions for daylighting and electric lighting - From Component to system efficiency" therefore pursues the goal to support and foster the better integration of electric lighting and daylighting systems including lighting controls with a main focus on the non-residential sector.

New research was conducted on various solar energy technologies including coupled optical-electrical-thermal analysis of a semi-transparent PV system [21], performance of a self-regulating PV/daylighting system [22], analysis of monofacial and bifacial photovoltaic modules [23], a transmissive concentrator photovoltaic module with cells ...

A relative study reviews the studies that use ANN systems to enhance the performance of different solar energy systems (Elsheikh et al., 2019). Review results show that ANN is beneficial in estimating and optimizing the performance of different systems. ... The authors develop 13 different energy and daylighting models for two other Greece ...

Section snippets Optical simulation and daylighting strategy. In the previous study, we proposed the concept of using the concentrator as the function element to achieve the daylighting function while generating electricity from the solar energy at ...

The overall system cost is also estimated. Some considerations on the economic expansion of the system in terms of efficiency are discussed. The results show that the presented optical fiber daylighting system is a strong candidate for low-price and highly efficient solution for solar energy application to building energy savings.

Fresnel lens has been extensively used as the solar energy concentrator in daylighting systems to refract and concentrate sunlight due to its high cost effectiveness and compact structure [33], [34]. In this study, nine Fresnel lenses with the diameter of 60 mm were mounted in a 3 × 3 frame on the aluminum panel with a dimension of 270 mm × ...

A wide range of developed and commercially available daylighting systems have been reported, however, they have just a single function, so they require an extra complex component to adjust daylighting intensity to create a better visual-comfort interior environment seasonally.

One of the main challenges for wide adoption of BIPV glazing is the optimisation of both daylighting and electricity generation (Hee et al., 2015), which are related to the transparency and power conversion efficiency of selected PV cells.Semi-transparent photovoltaic cells such as amorphous silicon (a-Si) and Dye Sensitised Solar Cell (DSSC) are popular choices for ...

The designed system offers better energy and daylighting performance than conventional BIPV glazing and low-e double glazing. ... Maximising the utilisation of the solar energy incident on building envelopes has been identified as an important strategy in sustainable building design [1]. Increasing the ratio of transparent and opaque surface ...

Effects of tubular daylight guidance systems on the daylighting performance and energy savings in office buildings under different climate zones Hanlin Li. 0000-0001-6724-7364 ; Hanlin Li 1. School of Mechanical Engineering, Southwest Jiaotong University ... Daylighting and overall energy performance of a novel semi-transparent photovoltaic ...

Passive daylighting is a system of both collecting sunlight using static, non-moving, and non-tracking systems (such as windows, sliding glass doors, most skylights, light tubes) and reflecting the collected daylight deeper inside with elements such as light shelves.Passive daylighting systems are different from active daylighting systems in that active systems track and/or follow ...

Active solar systems refer to systems that convert solar energy to usable form of thermal or electrical energy. Unlike passive systems, active solar energy technologies require the collection and transport of solar radiation through a medium and then the processing of the collected solar energy into thermal or electrical energy, employing specific components (for ...

Thus, with the use of the concentrator-photovoltaic window system on the building, not only can the solar energy utilization be greatly enhanced and does suit the building energy demands well, but also it improves the daylighting uniformity and ...

Moreover, the annual daylighting performance of the vacuum PV glazing needs to be investigated since the daylighting performance and the overall energy performance of window systems can be recognized as two individual evaluation indicators [29]. The thermal behaviour, daylighting behaviour and power generation ability of the proposed vacuum PV ...

Speaking of combing the natural daylighting with the PV system, compared with the traditional flat PV module, the concentrating PV technology offers more design imaginations, for the concentrators are usually made of the transparent material such as polymethyl methacrylate (PMMA). The traditional plat PV module will block the sun rays from ...

The acceptance angle of the newly designed optical system is 0.60° at which the solar power received by the system drops to 90%. ... Li et al. analyzed the cost of integrating hybrid semitransparent photovoltaic

and daylighting system to the office building in which the simple monetary payback of just around 15 years was estimated considering ...

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