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Ultraviolet Concentration Factor of a Truncated Compound Parabolic Concentrator under Different Weather Conditions (Article)

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Abstract

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Abstract— This study presents the results of ultraviolet radiation measurement in a truncated compound parabolic concentrator. The measurements were performed by using of a portable ultraviolet sensor both inside and outside the concentrator without the presence of receiver, under direct and diffuse solar radiation, to calculate the real value of the concentration factor of ultraviolet radiation. The truncated compound parabolic concentrator was designed in Solid Works and built via 3D printing, with a theoretical concentration factor of 4.6. This study showed the differences in the form of the ultraviolet radiation when measurements were made under direct radiation and diffuse solar radiation. These differences are important when measurements were made along the concentrator profile, at different heights within the concentrator and, also, along it. Finally, a concentration factor of 3.3 and 1.4 were calculated on a sunny and a cloudy days, respectively. These values correspond to a concentration efficiency of 71.7 and 31.3%, respectively, against the theoretical value of 4.6 proposed in the design. © 2020, Allerton Press, Inc.

SciVal Topic Prominence ⓘ

Topic: Solar Water Heater | Heat Pipe | Solar Collector

Prominence percentile: 97.439 ⓘ

Author keywords

photocatalytic reactor solar concentrators solar energy truncated compound parabolic concentrator ultraviolet radiation

Indexed keywords

Engineering controlled terms: 3D printers Solar radiation Ultraviolet radiation

Engineering uncontrolled terms: 3-D printing Compound parabolic concentrator Concentration factors Different heights Diffuse solar radiations Direct radiations Theoretical values Ultraviolet sensors

Engineering main heading: Concentration (process)

Funding details

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