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# ANALISIS OF THE CONVERSION EFFICIENCY OF A SOLAR TREE STRUCTURE

It is common to find conventional solar panels in the city supplying energy to homes, parks or schools; unfortunately, these systems disturb the image of the environment generating visual pollution and affecting people's mental health. In recent works, structures have been developed that maintain a balance between energy efficiency and design, focused on using conventional solar cell technology resulting in tree designs that look far from the real ones. The objective of this work is to model a tree-shaped structure assuming possible technologies that allow having solar cells with shape and curvature similar to that of a real leaf in order to design a structure according to the essence of the environment in which it is installed. For this purpose, the three-dimensional model of a tree defined from parametric equations that generate the trajectories in space for the shape of the trunk and branches by varying a scalar parameter is used; likewise, paraboloids are used to create the geometric locations of the leaves and shape them by manipulating concavity, curvature and rotation parameters. As part of the analysis of this model, an algorithm was created in Python, which replaces the paraboloid structure with the shape of a tree leaf where the distribution of solar energy on the surface is studied as a function of its curvature and the angle of incidence of the light rays; in this way, a graphic approximation of the energy efficiency of the structure was obtained, as a function of the curvature of the leaves, to seek a balance between maximum energy conversion and a design in harmony with the environment.

# Keywords

Photovoltaic structure, parametric equations, visual pollution, energy analysis

## Reference

S. Dey y B. Pesala, ((Solar tree design framework for maximized power generation with minimized structural cost,)) Renewable Energy, vol. 162, p´ags. 1747-1762, 2020, ISSN: 0960-1481. DOI: https://doi.org/10.1016/j.renene.2020.07.035.

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#### Author approval

I confirm

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