

The solar power has been and continues being the original and primary source of energy. With the exception of some sources of energy such as the nuclear one, or the tidal one, the rest of sources of energy come directly or indirectly of the Sun. The utilization of a source of energy supposes the exploitation of a natural resource, this utilization can have negative implications for the environment. The European Union has led the international effort to control the causative factors of the climate change, trying to identify profitable measures that could reduce the emission.

Objectives:

The objective of this PhD thesis is to develop a graphical procedure to allow assessment of the impact of solar radiation on surfaces. To do so a three-dimensional geometry model under consideration and the surrounding environment will be used.

Since result there will be obtained the values of radiation owed to the direct component and due to the diffuse component, distinguished for every point of the model. For the obtaining of the values the procedure bears the meteorology of the zone in mind, the shades produced by the environment on the model and the produced by the model on itself.

The graphical results will be stored as bitmap images in grayscale, there being established for every value of grey a value of received radiation.

Defined an environment with a geographical certain orientation and position, the methodology will allow to evaluate the incidental radiation, for a concrete period, on every point of the surfaces of the model.

Methodology:

- Validation of graphical methods.

This block has divided in four sections. In the first sections there is defined the methodology of work applied in the rest of them. The second section, one proposes a methodology for the calculation of the solar incident angle. In other two sections there appear and validate the models of estimation of the direct and diffuse radiation. Obtaining a correlation between the values of grey assigned to a surface and the component of the radiation got for the same one, either direct or diffuse.

- Procedure of accumulation of maps.

In this block, the concepts of irradiance map and irradiation map are defined, beside specifying how they are generated from the meteorological information and the images obtained of the model. It also presents the methodology to add maps allowing the accumulation of values for periods superior to an hour. There has been defined a method that, starting from a irradiation map, allows to know the average irradiation got for a surface represented by an area of the same one. In another paragraph there define the energies map, the cosines map and the function Energy that allows to know the energy that receive the surfaces represented in the area selected of the map.

- Methods for comparing maps. Useful for the analysis of results.

- Implementation

One possible implementation of the proposed methodology is presented, presenting the tools chosen. For part of the accumulation maps it has been chosen to develop our own application.

- Example of use. Practical example that the implementation of the developed methodology is used.

Results and discussions:

In this paragraph there appear three cases of study on which the implementation of the methodology will be applied obtaining the results. The choice of the cases is not chance, and has been realized attending to different criteria. Different geographical zones have been chosen, having different latitudes. It has been tried that the studied geometries were guarding certain similarities in order to be able to compare results.