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EFFECT OF ATMOSPHERIC MASSES ON THE SPECTRAL INTENSITY OF SOLAR RADIATION

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Measuring the effectiveness of converting solar energy into electrical energy phototransducer is usually carried out with the help of artificial light sources, with a particular ratio of the extent to which power and spectral composition, above the stipulated sunlight AM. Often resorted to measurements of parameters of photovoltaic cells under natural conditions (bright sunshine, the sky is cloudless or cloudy). And in this case, the live-solar radiation (ie, the actual atmospheric mass) will differ in power and spectral composition of the approved emission standard AM 1.5.

Size atmospheric mass towards sunlight will vary depending on the height of the solar disk angles relative to the horizon, i.e. on latitude, date, year and time of day. In connection with this urgent problem is to determine the magnitude relation atmospheric mass towards solar radiation intensity in its spectral absorption edge of the semiconductor material photoconverter.

The maximum value of the atmospheric mass of terrestrial solar radiation is determined by the condition for finding the solar disk on the horizon.

The purpose of research - a solution of the above problem in the presentation of the atmospheric layer corresponding to AM-1.5 as a filter having appropriate transmittance for the corresponding wavelength.

The results of research. The spectral intensity of the solar radiation at the standard AM-1.5 lower than that for AM -0 near a short wavelength (0.7 microns) and at wavelengths greater than 0.7 microns is observed almost parity. In the same region should be noted the presence of certain failures spectrum of AM-1.5 with respect to the AM-0, which is due to absorption of certain wavelength regions of solar radiation the molecules of water vapor and carbon dioxide.

This fact can be explained by the emergence of the Fraunhofer lines of photon absorption by Earth's atmosphere, containing an appreciable amount of water vapor and carbon dioxide.

In order to evaluate the numerical spectral transmittance atmospheric layer AM 1.5 with respect to extra-atmospheric solar radiation AM 0 were compared to the values of the intensities of these emissions according to the literature reference data.

Due to the fact that with increasing atmospheric mass spectral transmittance will decrease the power dependence, considered above with respect to the basic amount of AM-1.5, it is possible to estimate the spectral intensity of solar radiation for any given value of atmospheric mass.

The spectrum for the atmospheric mass 9 AM and 36 AM on the background of extra-atmospheric solar spectrum AM 0. Both the spectrum characteristic of the Sun is near the horizon, have a significant energy potential in the absorption edge of semiconductor material - silicon.

Conclusions

These results are of interest for the practice in the assessment of the parameters of solar energy systems at different times of the day light.