Министерство образования Республики Беларусь

Учреждение образования
«Белорусский государственный педагогический
университет имени Максима Танка»

Физико-математические науки и информатика, методика преподавания

Материалы Международной студенческой научно-практической конференции г. Минск, 19 апреля 2017 г.

Минск 2017

FLAT REFLECTORS FOR STRENGTHENING LIGHTING BY POINT SOURCES

S.Tabolich, N.Petrovskii, BSPU, Minsk, Belarus;
K.Baighuman, A.Shalabai,TSPU, Taraz, Kazakhstan;
P.Kruglenya, Gymn. №20, Minsk, Belarus

scientific supervices: prof. V.Sobol; prof. B.Korzun; prof. S.Tomaev;
ass.prof. B.Nushnimbaeva; ass.prof A.Nauryzbaev;
teacher of highest qualific. cat. N.Niskovskih

The creation of directional light fluxes is important task at constructing schemes for rational illumination of limited localized areas of on-site execution, for example, for working with small details during hourly assembly, reading small texts requiring high uniform illumination of the table areas in the size of the keyboard of the personal computer or less. To solve such problems, it is not always expedient to involve extended radiating systems, taking into account the need for its attachment above the illuminated surface and the fact that it is possible to select a lamp operating in an energy saving mode as a point source. To redirect the flow, emitted in all directions is possible a corresponding reflector. In the traditional, flat version of reflector the reinforcement, of course, increases the luminous flux directed to the desired side, but does not improve its uniformity.

The report presents the results of an analysis of the light field created by a point source operating in conjunction with a flat mirror reflector. The coefficients of the use of light energy are compared at some levels of source spacing from the illuminated flat surface and illumination over a flat circle. From a point source with a light intensity *I*, as is known, the flux propagates in a all directions being the heterogeneous one to a greater or lesser extent, depending on the size of the illuminated site and its orientation. The incoming flux in some direction is

$$F = 4\pi I \int_0^{\vartheta_1} Sin\vartheta d\vartheta .$$

The average illumination value over the area of a flat circle of radius *R* is obtained by summing the local normal components of the real and imaginary source.

$$\overline{E} = \frac{2Ih}{R^2}\left[\left(\frac{1}{h} - \frac{1}{\sqrt{(h-x)^2 + R^2}}\right) + \left(\frac{1}{h} - \frac{1}{\sqrt{(h+x)^2 + R^2}}\right)\right].$$

here *h* and *x* are the distance from the flat reflector to the illuminated surface and the point emitter. Thus, by varying the depth of the source *x* suspension, it is possible to expand the illumination level of the working area.