
Estimation of the Earth's surface illumination by space reflector designed to stabilize atmosphere temperature regime

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The paper considers the usage of solar-sailing ship (SPC) located in the libration points of the Earth-Moon system, which will increase the Earth's surface insolation in order to stabilize the temperature regime of the Earth's atmosphere under the conditions of global cooling. A quantitative analysis of the light exposure in visible and UV spectral regions, which is able to cause offsetting impact on living organisms, is done using methods of geometrical optics. The findings of the light pollution impact on the environment and people are compared with those obtained by other authors. Fundamental technical problems associated with the construction of SPC are formulated.

Keywords: sun, reflector, illumination, ecology, light pollution, UV index

REFERENCES

- [1] Sizentsev G.A., Sotnikov B.I. *Izvestiya RAN. Energetika — Proceedings of the Russian Academy of Sciences. Power Engineering*, 2009, no. 2, pp. 91–100.
- [2] Sizentsev G.A. *Kosmicheskaya tekhnika i tekhnologii — Space Engineering and Technology*, 2013, no. 3, pp. 82–95.
- [3] Barmasov A.V., Barmasova A.M., Yakovleva T.Yu. *Uchenye zapiski Rossiyskogo gosudarstvennogo gidrometeorologicheskogo universiteta — Proceedings of the Russian State Hydrometeorological University*, 2014, no. 33, pp. 84–101.
- [4] Bingman V.P., Jechura T., Kahn M.C. (2006). Behavioral and neural mechanisms of homing and migration in birds. In M.F. Brown and R.G. Cook (eds.). *Animal Spatial Cognition: Comparative, Neural, and Computational Approaches*. Available at: www.pigeon.psy.tufts.edu/asc/bingman/ (accessed 28 December, 2016).
- [5] *Rationalizing nomenclature for UV doses and effects on Humans*. Available at: http://www.wmo.int/pages/prog/arep/gaw/documents/GAW_Report_211_CIE.pdf (accessed 28 December, 2016).
- [6] Allen K.U. *Astrofizicheskie velichiny* [Astrophysical quantities]. Moscow, Mir Publ., 1977, 448 p. [in Russ.].
- [7] *Global Solar UV Index*. World Health Organization. Available at: <http://www.who.int/uv/publications/en/GlobalUVI.pdf?ua=1> (accessed 28 December, 2016).
- [8] Bebchuk L.G., Bogachev Yu.V., Zakaznov N.P. *Prikladnaya optika* [Applied optics]. St. Petersburg, Lan Publ., 2009, 320 p.
- [9] Khromov S.P., Petrosyants M.A. *Meteorologiya i klimatologiya* [Meteorology and climatology]. Moscow, Moscow State University, Nauka Publ., 2006, 582 p.
- [10] Panyushin S.K. *Elektronnyi nauchno-obrazovatelnyi vestnik Zdorove i obrazovaniye v XXI veke — On-line Scientific & Educational Bulletin “Health & education millennium”*, 2012, vol. 14, no. 10, pp. 289-291.

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- [11] Aladov A.V., Zakgeim A.L., Mizerov M.N., Chernyakov A.E. *Svetotekhnika — Light & Engineering*, 2012, no. 3, pp. 7–10.
 - [12] Kaptsov V.A., Sosunov N.N., Shishchenko I.I., Viktorov V.S., Tulushev V.N., Deinego V.N., Bukhareva E.A., Murashova M.A., Shishchenko A.A. *Gigiena i sanitariya — Hygiene and Sanitation*, 2014, no. 4, pp. 120–123.
 - [13] Jin H., Jin S., Chen L., Cen S., Yuan K. *IEEE Photonics Journal*, vol. 7. pp. 1–9.
 - [14] Wyszecki G. *Color Science: concepts and methods, quantitative data and formulae*. 2nd ed. Wiley-Interscience, New York, 2000, 968 p.
 - [15] Raikunov G.G., Komkov V.A., Melnikov V.M., Kharlov B.N. *Tsentrobezhnye beskarkasnye krupnogabarnitnye kosmicheskie konstruktsii* [Centrifugal frameless large space structures]. Moscow, FIZMATLIT Publ., 2009, 448 p.

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