Approaches to selecting rational variants of the ballistic construction of space telescopes for operative detection and determination of physicochemical properties of asteroids unfavorable for observation from the Earth

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The article proposes an approach to the target efficiency estimation for space telescopes of visible range intended for the detection of dangerous celestial bodies (DCB). A comparative analysis of the target efficiency of several variants of such space telescopes placing in the Earth's orbit around the Sun is performed. The most efficient variants of constructing a system of space telescopes were selected among the considered ones with respect to detection of Earth-threatening DCB, unfavorable for observation by ground-based telescopes, during a given warning time. The approach to selecting space telescopes of infrared range rational accommodation is proposed and justification of the choice for determining the physicochemical properties of DCB, unfavorable for observation from the Earth is given.

Keywords: asteroid-comet danger, visible range, infrared range, space telescope, dangerous celestial bodies, target efficiency

REFERENCES

- [1] Bodrova Yu.S. *Obscherossiyskiy nauchno-tekhnicheskiy zhurnal "Polet" All-Russian Scientific-Technical Journal "Polyot"* ("Flight"), 2014, no. 11, pp. 23–28.
- [2] Emelyanov V.A. Kosmonavtika i raketostroenie Cosmonautics and Rocket Engineering, 2008, no. 2 (51), pp. 117–122.
- [3] Dedus F.F., Emelyanov V.A., Yolkin K.S., Bodrova Yu.S., Merkushev Yu.K., Raykunov K.G. Proekt "Kosmicheskiy baryer" operativnogo obnaruzheniya malykh asteroidov na stolknovitelnykh s Zemley traektoriyakh, ne obnaruzhivaemykh nazemnymi teleskopami ["Space Barrier" project of operational detection of small asteroids on collisional with the Earth trajectories not detected by ground-based telescopes]. *Trudy mezhdunarodnoy konferentsii "Okolozemnaya astronomiya 2015" 31 avgusta 5 sentyabrya. Poselok Terskol* [Proceedings of the International Conference "Near-Earth Astronomy 2015". August 31 September 5. Terskol village]. Moscow, Yanus-K Publ., 2015, pp. 188–194.
- [4] Bodrova Yu.S. Kosmonavtika i raketostroenie Cosmonautics and Rocket Engineering, 2014, no. 3 (76), pp. 66–72.
- [5] Puchkov V.A., ed. Asteroidno-kometnaya opasnost: strategiya protivodeystviya [Asteroid-comet danger: counteraction strategy]. Moscow, FSFI Research Institute CDES Publ., 2015, 272 p.
- [6] Naroenkov S.A., Shustov B.M. *Kosmicheskie issledovaniya Cosmic Research*, 2012, vol. 50, no. 3, pp. 229–233.
- [7] Raykunov K.G., Emelyanov V.A. Kosmonavtika i raketostroenie Cosmonautics and Rocket Engineering, 2013, no. 4 (73), pp. 154–162.
- [8] Raykunov K.G. Kosmonavtika i raketostroenie Cosmonautics and Rocket Engineering, 2013, no. 3 (72), pp. 185–194.

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