

Universal Portable Functional Control System for Small Spacecraft Onboard Equipment

S. A. Podshivalov, *postgraduate student, junior researcher, podshivalovstas@gmail.com*
Moscow Institute of Physics and Technology, Dolgoprudny, Moscow Region, Russian Federation

A. S. Zlobin, *senior researcher, zlobin@rt.mipt.ru*
Moscow Institute of Physics and Technology, Dolgoprudny, Moscow Region, Russian Federation

T. V. Kondranin, *Dr. Sci (Phys.-Math.), professor, tvk494@yandex.ru*
Moscow Institute of Physics and Technology, Dolgoprudny, Moscow Region, Russian Federation

S. S. Negodyaev, *Cand. Sci. (Engineering), snegod@mail.ru*
Moscow Institute of Physics and Technology, Dolgoprudny, Moscow Region, Russian Federation

Abstract. Testing and ground adjustment of onboard equipment of small spacecraft is an important and integral task of each mission. This article presents the results obtained in 2013–2018 at MIPT of research and development of a specialized small-size universal functional control system (FCS) for verification of onboard electronic equipment for small spacecraft. A key feature of the created FCS is its versatility implemented by building a system architecture based on a field-programmable gate array (FPGA). In addition, significant results are the low cost and small size of the system compared to the modular solutions presented on the market. The portability of the system makes it possible to combine functional control and testing of onboard equipment with other types of tests, for example, thermal vacuum, which most accurately simulates the behavior of the device being tested on the orbit. Comprehensive testing and functional control of the onboard computer for small spacecraft developed at MIPT was completed by means of the developed FCS.

Keywords: functional control, ground adjustment, pre-flight testing, onboard equipment, small spacecraft