



Title: Prospects for application of transformable-volume structure technologies in the designing of space vehicles

Leonid M. Lobanov, Valentin S. Volkov

The E.O. Paton Electric Welding Institute (PWI), Bozhenko street, 11, Kiev-150, 03680, Ukraine

Modern satellites have passed a large way of evolution due to the development of technologies of microminiaturization of their components. At the same time many missions require the launch of large-size objects to the orbit, such as reflectors of different-purpose antennas and pivot antennas, thermal shields for space telescopes, load-carrying and extending truss structures, passive satellites, etc., and in many cases various methods can be used for their transformation into a compact form during the time of their delivery to the orbit. There are known successful experiments with balloon satellites, inflatable antenna experiment (IAE), being in-service a mirror antenna on NASA's new SMAP observatory and challenging developments in this field, such as chemically-rigidized expandable structures ("CRES") etc. The mentioned structures, known as deployable structures, are made in the most cases of soft materials, and the separate task is to impart a spatial rigidity to the transformable shells using different methods.

The technology of volume deformation, developed at the E.O.Paton Electric Welding Institute (PWI), allows designing vacuum-tight deployable shell structures of sheet metals that provide their load-carrying properties and high shock resistance. These structures, named transformable-volume structures (TVS), are the embodiment of experience of successful orbital experiments of the PWI and can be alternative to the known technologies in those cases, when the forced support of design shape of the shell is difficult or not rational, being a simple and reliable assembly having a potentiality to change one of the linear sizes by 40 and more times.

Biography

Leonid M. Lobanov is a professor and deputy director of the E.O. Paton Electric Welding Institute (Kiev), academician of the National Academy of Sciences of Ukraine; he is the author of more than 700 scientific papers and 60 patents. He heads the institute's division, one of the main aims of which is the creation of advanced transformable structures for space techniques.

Valentin S. Volkov, scientific associate of the E.O. Paton Electric Welding Institute, who is developing the area of transformable-volume structures (TVS) for space engineering.

valentinvolkov@ukr.net