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A PERMANENT SOLUTION FOR CONTROLLING THE SMALL SPACE DEBRIS POPULATION

Abstract

In late 2016, new approaches and methods were discovered that appear to offer a viable and cost-effective solution to reducing debris from congested orbits, stabilizing the near-Earth space zone such that satellite operations will remain safe for constellations and individual satellites. A newly-issued US patent that discloses a novel and fundamental method of reducing and controlling the population of small debris objects allows the creation of a permanent solution to the threat of near-Earth space debris encounters with operating satellites. In order to avoid complete clogging of low orbits at least some fraction of debris objects will have to be continually removed. For the first time, natural orbital phenomena are coupled with new orbital maneuvering techniques to create an innovative solution offering safe space operations for the future. Most suggested solutions have required the use of extremely expensive and complex space systems in order to accomplish the removal of individual, large debris objects. However, the population of such objects presents a relatively low level of direct threat. Almost no work has been done on the problem of controlling the high population of small debris objects that represent a major source of damage to operating satellites. In fact, the complexity and expense of removing individual objects have prohibited actual debris removal missions. The approach described here focuses on small debris removal and should cost only a fraction of other possible options for sustaining safety because it is operationally simple and enables the removal of large numbers of small debris objects without complicated in-orbit maneuvers. A system that maintains stable control of the debris population will become mandatory for future assured access to and use of space. Any acceptable solution will have to offer permanent control of debris levels in low-Earth orbits. To be clear, near misses between operating satellites and orbiting debris have been increasing over the past five decades and have reached a level of serious concern to satellite operators. If nothing is done to continually remove a certain fraction of debris, most operating satellites will, at some point, experience catastrophic encounters. Projections indicate the possible total loss of satellite services. Therefore, without some remedial actions, it is possible that all civil, commercial and national security space applications will be lost for many decades, or longer. This situation is clearly unacceptable. The approach described here can permanently stabilize the near-earth space traffic environment to assure continued safe flight operations.