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THE EXO-BRAKE AS AN INEXPENSIVE MEANS OF ACHIEVING TARGETED DE-ORBIT FROM  
LOW EARTH ORBIT – RECENT FLIGHT EXPERIENCE AND FUTURE APPLICATIONS

**Abstract**

The Exo-Brake is a simple, non-propulsive means of de-orbiting small payloads from orbital platforms such as the International Space Station (ISS). Recent flight experiments involving the TechEdSat (TES) 6, 7, 8 nano-satellites are discussed in terms of both ‘targeted’ and ‘disposal’ de-orbit techniques. The effort builds on the previous flight experiments with fixed Exo-Brake surface areas and is now extended to changing the ballistic coefficient at will. In addition, innovations involving improved uplink/downlink communication and GPS for improved targeting control are incorporated. The different targeting approaches are outlined - which will eventually be imbedded on future nano-satellite for autonomous de-orbit and recovery. The extension of the concept to a 1-stage, multi-stage, and lifting entry sample return system is discussed.