SPACE DEBRIS REMOVAL AND MITIGATION

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ABSTRACT

There are several relatively simple measures that will reduce the amount of debris in space. A sudden release of pressure often results, causing an explosion and spewing hard-to-track fragments, into orbit, adding to the debris field. The idea is to prevent the creation of new debris to protect valuable low Earth and geostationary orbits. The launch vehicle breaks up in orbit, The problem arises when launch vehicle in lower stages generally fall back into the atmosphere and completely burn up, providing a tidy, solution . A good margin of launch success by carrying extra fuel onboard, as this comes in handy if the engine has to burn a little longer than planned. However, that spare fuel mostly remains inside pressurized tanks once the rocket stage is discarded into Earth orbit. The mechanical integrity of the booster's internal components breaks down; lines leak, corrosive fuel seeps into crevices, meteoroids strike and penetrate. Other onboard power sources serve as latent explosion triggers, pressurized systems like fuel cells and hypergolic fuels. Stopping launch boosters from exploding is a big step. And its solution is simple: once the upper stage is discarded, simply run the engine until the fuel is depleted. Another fix is simply to vent any remaining fuel to space. Batteries and other onboard energy sources can be similarly passivated. The other measures are to include space-based lasers to slow then deorbit existing junk, deploying "tethers" to drag craft back down into the atmosphere or grabbing objects with a huge sling. SMART-1 (Small Mission for Advanced Research in Technology - 1) spacecraft, now orbiting the Moon, uses a new ion-thrusting electric propulsion (EP) engine. The engine, however, requires very little fuel compared to a conventional rocket motor.