

Close Proximity Operations for Implementing Mitigation Strategies

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Central to almost any characterization or mitigation mission to a small solar system body, such as an asteroid or comet, is a phase of close proximity operations on or about that body for some length of time. This is an extremely challenging environment in which to operate a spacecraft or surface vehicle. Reasons for this include the *a priori* uncertainty of the physical characteristics of a small body prior to rendezvous, the large range that can be expected in these characteristics, and the strongly unstable and chaotic dynamics of vehicle motion in these force environments. To successfully carry out close proximity operations about these bodies requires an understanding of the orbital dynamics close to them, a knowledge of the physical properties of the body and the spacecraft, and an appropriate level of technological sensing and control capability on-board the spacecraft. To go the next step and implement some mitigation strategy can involve even more challenges, such as placing large structures or devices on the surface of the body, inside the body, or in close proximity to the body for extended periods of time. This paper will discuss the range of possible dynamical environments that can occur at small bodies, their implications for spacecraft control and design, and technological solutions and challenges to the problem of operating on and in close proximity to the surface of these small bodies.

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