Spacecraft Mission Design for the Destruction of Hazardous Near-Earth Objects (NEOs) via Distributed-Energy Explosives

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Blasting Mission Overview

- A spacecraft delivers a human and robot crew, drilling equipment, and explosives to a NEO.
- Blast holes are drilled into the NEO at the appropriate locations and depths.
- Explosive charges are placed in the blast holes and detonated in the appropriate sequence.
- The process is repeated iteratively, as required, to complete the fragmentation of the NEO into pieces < 50 m in mean diameter.
- Blasting may be employed to deflect a NEO.

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Study Results and Conclusions

- Some blasting missions to small NEOs are be feasible in terms of current launch and propulsion technology.
- Blasting missions to large NEOs require significant decreases in the blasting equipment mass and/or significant increases in launch and propulsion technology.
- Other required enabling technologies include:
  - Human crew life support for multi-year missions in interplanetary space.
  - Methods and mechanisms for anchoring drill equipment to a NEO and providing sufficient reaction force.
  - Reliable precision NEO spacecraft proximity and surface operations.

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