

MINING NEAR EARTH OBJECTS

Kartikey Joshi(mechanical), Vinay Gupta(ece), Pawan Gupta (eee)

This paper is related to mining on Near Earth Objects(NEOs).

NEO refers to asteroids traveling around the sun in highly elliptical orbits. Spectroscopic studies suggest the presence of platinum group metals, semiconductors, nickel-iron and silicates of grades about 100 ppm(mines in south Africa have grades of 5-10 ppm) on NEOs. 3554 AMUM, a mile wide NEO has been estimated to cost \$20 trillion and contains 30 times as much metal as humans have mined throughout history. In space it is the change in velocity(Δv) and not the distance between two points that determines the hardness in moving between them. Due to low escape velocity on NEOs the (Δv) value is small. Thus NEOs are far more accessible than any other celestial body.

Due to microgravity on NEOs a satellite must dock on it using a harpoon like device, because a gentle nudge might send it hurtling into space. Light, robotic and solar powered equipment will reduce the fuel consumption. Heat from solar mirrors will melt the ice which can be used as fuel in steam propelled rockets or could be broken down into hydrogen and oxygen (major rocket fuels) or as drinking water in space stations. Solar mirrors can also be used for smelting the ore and digging machines would drill into the surface. The benefits of working under low gravity can be exploited by rotating the asteroid using rockets, making the ores to come out from the drilled hole(which are covered with huge bags)and fill into the bags which can be sealed and transported. A canopy around the site solve the problem of suspended matter interfering with the machinery. The setup could later be transported to another site.

Keywords: NEO,semiconductors,solar mirrors,celestial body,microgravity.