

Question #68890, Physics / Mechanics | Relativity

Our Addition Problem this week will deal with an asteroid the "size of Texas" heading our way. Our asteroid is heading toward earth at 22,000 mph with a mass of 6.2×10^{21} kg. Instead of a misfit crew of oil drillers we send a small intrepid spacecraft to nudge it off course. After setting down on the asteroid it will give a constant force of 5.0 N. We only need to change the velocity of the asteroid by 0.30 cm/s to have it miss the Earth. How long must the force act on the asteroid to avert disaster?

Solution

$$\Delta p = m\Delta v = F\Delta t;$$

$$\Delta t = \frac{m\Delta v}{F};$$

$$\Delta t = \frac{6.2 \times 10^{21} \times 0.30 \times 10^{-2}}{5.0} = 3.7 \times 10^{18} \text{ s}$$