

J05M.2 - Planet Moving Through Dust Cloud

Problem

A planet of mass M and radius R moves through a cloud of interplanetary dust at a constant velocity v_0 . The dust particles have negligible mass. Depending on its initial position when the planet is still far away, each dust particle will either hit or miss the planet as it moves by. When they strike the planet, they stick. The capture cross section σ is defined as the transverse area within which all dust particles are captured. Compute σ . *Hint:* it is useful to consider the capture process in the reference frame of the planet.

