Avalanche Project

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Abstract

In this article we want to observe the velocity of delivering package and want to check the possibility of controlling the touch down velocity

1 Free-Fall Study

At first , we consider a sphere that has free-falling in the present of of air resistance F_d and mass force mg the formulations are calculated as

$$\sum F = m\frac{\mathrm{d}V}{\mathrm{d}t} \tag{1}$$

$$F_d = \frac{1}{2}c_1\rho v^2 \tag{2}$$

$$mg - f_d = m\frac{\mathrm{d}v}{\mathrm{d}t} \tag{3}$$

$$\frac{\mathrm{d}V}{\mathrm{d}t} + Bv^2 = g \tag{4}$$

$$B = \frac{c_1\rho}{2m} \tag{5}$$

$$\int \frac{\mathrm{d}t}{g - Bv} = \int \mathrm{d}t \tag{6}$$

$$\ln(g - Bv) = -Bt - c_1 B \tag{7}$$

$$g - Bv = e^{-Bt}e^{-c_1 t} \tag{8}$$

$$g - Bv = Ce^{-Bt}\ ;\ C = e^{-c_1 t} \tag{9}$$

$$v(t) = \frac{2m(g - Ce^{-\frac{c_1\rho}{2m}t})}{c_1\rho} \tag{10}$$