vx

vs

x

R

The airplane needs to decelerate at a m/s2 within distance of xm. What is the speed before starting deceleration?

Time for deceleration t=(vx-vs)/a (1)

Distance for deceleration x=tvx-0.5at2 (2)

Substitute (1) into (2) x= vx(vx-vs)/a-0.5a((vx-vs)/a)2

x= (vx2- vx vs)/a-0.5a(vx-vs)2/a2

x= (vx2- vx vs)/a-0.5(vx2-2vxvs+vs2) /a

2ax= (2vx2-2 vx vs)-(vx2-2vxvs+vs2)

2ax= 2vx2-2 vx vs-vx2+2vxvs-vs2

2ax= vx2-vs2

vx2 = vs2+2ax

vx=sqrt(vs2+2ax)