

## Project 2: Verification constants, inputs and trajectory

$g = 9.81 \text{ m/s}^2$  ... acceleration due to gravity

$C_d = 0.8$  ... discharge coefficient

$\rho_{\text{air,amb}} = 0.961 \text{ kg/m}^3$  ... ambient air density

$\text{Vol}_{\text{bottle}} = 0.002 \text{ m}^3$  ... volume of empty bottle

$P_{\text{amb}} = 12.03 \text{ psi}$  ... atmospheric pressure

$\gamma = 1.4$  ... ratio of specific heats for air

$\rho_{\text{water}} = 1000 \text{ kg/m}^3$  ... density of water

$D_{\text{Throat}} = 2.1 \text{ cm}$  ... diameter of throat

$D_{\text{Bottle}} = 10.5 \text{ cm}$  ... diameter of bottle

$R = 287 \text{ J/kgK}$  ... gas constant of air

$M_{\text{Bottle}} = 0.07 \text{ kg}$  ... mass of empty 2 liter bottle

$C_D = 0.5$  ... drag coefficient

$P_{\text{gage}} = 50 \text{ psi}$  ... initial gage pressure of air in bottle

$\text{Vol}_{\text{water,initial}} = 0.001 \text{ m}^3$  ... initial volume of water inside bottle

$T_{\text{air,initial}} = 300 \text{ K}$  ... initial temperature of air

$v_0 = 0.0 \text{ m/s}$  ... initial velocity of rocket

$\theta = 45^\circ$  ... initial angle of rocket

$x_0 = 0.0 \text{ m}$  ... initial horizontal distance

$y_0 = 0.1 \text{ m}$  ... initial vertical height

Integration time = 0sec to 5sec ... tspan

