CAT ONE

UNIT CODE: SPC 2310

UNIT NAME: SIMULATION & MODELING

PARTICIPARTS:

ADM NO.: NAME:

PA107/G/7475/19 JEREMIAH MULI

PA107/G/14437/21 JULIUS MUIA

PA107/G/14432/21 MOSES KAGWIMI

Question

Simulate the shooting of a handgun of your choice. Consider the following parameters; mass, velocity and shooting range. Consider a shot from -π to π. Explain the effects on shooting at 90˚.

ANSWER:

Handgun choice is Dan Wesson DWX.

**DAN WESSON DWX SPECIFICATIONS**

* **Type:** Recoil operated, semi­automatic
* **Cartridge:** 9mm
* **Capacity:**19+1 rds.
* **Overall Length:** 7.5 in
* **Barrel:** 4.95 in.
* **Width:**1.5 in.
* **Height:**5.85 in
* **Weight:** 2 lbs., 13 oz. (tested)
* **Finish:** DLC (steel); anodized, red (aluminum)
* **Grip:**Aluminum, checkered pattern
* **Sights:** Steel; green fiber-optic (front); black, notch, adjustable (rear)
* **Trigger:** Single action only; 3 lbs., 8 oz. (tested)
* **Manufacturer:** Dan Wesson, 800-955-4486,

**THE BREAKDOWN**

The barrel has an aggressive target crown and sits flush with the end of the slide and dustcover. An M1911’s slide rides outside of the frame’s rails, and the barrel typically has both a bushing and a swinging link. With a CZ 75, the slide rides inside the frame, and the bushing-­less barrel locks up with the breech without the use of a link. With the DWX you get a combination of the two. The slide rides outside the rails like an M1911, but it uses a bushing-­less barrel with a CZ 75-type lockup. The ramped barrel is unique to the DWX, too, and had a flared end to more tightly mate with the slide. The DWX has an external extractor with a spring (like a CZ 75), unlike the internal, tensioned and sometimes finicky extractor design of the M1911.

The top of the slide is flat and serrated. The front sight is steel with a green fiber-optic insert, which is easy to spot in any light. The front sight uses a modern M1911 dovetail. The steel rear sight is basic black and serrated, but there is a click-  
adjustable screw on top of the rear sight to allow elevation adjustments. The rear sight is secured in the dovetail by two set screws; loosening them allows the sight to drift in the dovetail for windage corrections. Then, lock it back down. The set screws are a nice feature. Anyone who has spent a lot of time putting rounds downrange through handguns has likely had a rear sight come loose in the dovetail.

This pistol has a single-­action-­only (SAO), recoil-operated system. For this pistol to fire, the hammer has to be cocked. If the hammer is down, it won’t. The DWX has a bilateral manual thumb safety with nicely extended levers. With the hammer cocked, the safety can be engage by pushing it up. If you’re going to carry an SAO gun for self-­defense, you should carry it “cocked and locked,” as they say. Therefore, you can draw and fire it with one hand, in one smooth continuous movement. Even though the DWX has a grip profile closer to that of a CZ 75, the thumb safety appears to have come from a DW1911. Both its position and function feels like a 1911’s, which is great. Unlike a 1911, though, this pistol has no grip safety.

MATLAB code to simulate a hand gun,and include parameters like;mass, velocity, distance

% Constants

m = 0.1; % mass of the bullet (kg)

k = 1000; % spring constant (N/m)

b = 10; % damping coefficient (Ns/m)

F = 100; % force applied to the bullet (N)

x0 = 0.1; % initial displacement of the bullet (m)

v0 = 0; % initial velocity of the bullet (m/s)

% Simulation parameters

tStart = 0; % start time (s)

tEnd = 1; % end time (s)

dt = 0.001; % time step (s)

% Initialization

t = tStart:dt:tEnd;

x = zeros(size(t));

v = zeros(size(t));

x(1) = x0;

v(1) = v0;

% Simulation loop

for i = 2:numel(t)

% Calculate acceleration

a = (F - k \* x(i-1) - b \* v(i-1)) / m;

% Update velocity and displacement

v(i) = v(i-1) + a \* dt;

x(i) = x(i-1) + v(i) \* dt;

end

% Plotting the results

figure;

plot(t, x);

xlabel('Time (s)');

ylabel('Displacement (m)');

title('Gun Simulation');

% Additional parameters for shooting from -π to π

theta = linspace(-pi, pi, numel(t)); % angles from -π to π

distance = x .\* cos(theta); % distance traveled by the bullet

% Plotting the distance traveled by the bullet

figure;

plot(theta, distance);

xlabel('Angle (radians)');

ylabel('Distance (m)');

title('Bullet Distance vs. Angle');

% Additional parameters for shooting at an angle of 90 degrees

angle = pi/2; % angle of 90 degrees

distance\_90 = x .\* sin(angle); % distance traveled by the bullet at 90 degrees

% Plotting the distance traveled by the bullet at 90 degrees

figure;

plot(t, distance\_90);

xlabel('Time (s)');

ylabel('Distance (m)');

title('Bullet Distance vs. Time at 90 Degrees');