Rocket Launcher Protocol

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Abstract: The trajectory of a rocket launcher is hereby modelled using signal processing.

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1. INTRODUCTION

The trajectory of a rocket launcher is hereby modelled using signal processing. The energy gained is energy lost in its trajectory. To reach an impact threshold signal processing algorithms are used for the rocket to gain acceleration. Thus the rocket launcher is hereby modelled as a input signal reaching the target with the desired acceleration. The viscosity of air causing changes to the rocket is modelled as an operational amplifier.

2. CONCEPTS INVOLVED

Launch speed and energy to be a parameter. Launch direction is another parameter.

General structure for rocket launcher:

Initial velocity = u

Final velocity = v

Acceleration applied = variable (depending on electronic concept used)

v = u + at

E_final = E_initial as explained above

(iff) a = g

To concentrate:

Final velocity and final energy

Acceleration is changed accordingly with the help of electronics.

Properties:

a) Geometry to decide direction of missle

b) Energy is decided by the design of circuit inside the missle.

The point b is discussed as below.

Air is modelled as an operational amplifier ie. Input, R1, R2 and output in negative feedback amplifier.

Output = -R2/R1 x Input

Voltage is inverted at the output in this structure.

Energy = 1/2 x m x v xv as potential energy = 0 in both the ends.

Voltage is a modelled graph and opamp is modelled resistance of air + gravity.

Therefore the resistance (ie. acceleration) is modelled as R2/R1.

The output voltage = -a x input voltage

The voltage relates to velocity as v = u + at = -at if u = 0

ie. Final velocity = -at

From analysis horizontal velocity is not modelled in this form and only vertical velocity is modelled as velocity.

Therefore initial vertical velocity is zero

If final vertical velocity is v, energy gained = 1/2 x m x v xv = energy gain

a = R2/R1 = g x 1/R1

Resultant acceleration a = g + ax = g/R1

g(1-1/R1) = ax

ax = g(R1-1)/R1

Energy gain = 1/2 x m (gxg + ax x ax + 2gax) x t x t

ax is computed using mean squared computation.