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Parameters Simulation of Missile Track Trace with Linear & Exponential Equation

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Abstract: - *the missile simulation as attacking weapon in fight has been studied recently in papers. In this paper it is discussed that the difference length L and height H and parameter n and K is. The linear and exponential function with one unknown is discussed too and find the accuracy is the finest at parameter K of this equation while it is the lowest at simple equation and parameter n of this equation. The length of 100m and height of 300m and 400m is the predicted best positions in simple linear equation. The length of 500m and height of 300m and then length of 300m and height of 200m is the best two positions in exponential equation.*

Keywords: - *missile track trace， simulation, simple and exponential equation, parameter n & K*

1 Introduction

The missile has become a significant automatic track weapon in currency military as an attacking tool. It is strong missile who owns it who could won the war is clear more and more. So it has to be a significant issue to research missile that can carry nuclear missile to menace strategy role among countries. At first it is searched that missile track trace is important too since the inertia force and gravity weight exists in. [1,2] In this paper the missile track trace has been searched to look for parameters on simple and quadratic equation for benefiting parameter a & b with height & length. Through calculating the equations are erected for them. It has been hopeful that the results will benefit for accurate control missile by plane. Because the final stage is determined in missile attacking target usually by plane the attacking trace in final is proposed to significant position to think over and calculate carefully. In order to attack accurately the missile track trace equation need to be established and check carefully as soon as possible in modern war. We can discuss the accuracy of missile according to parameter n &K in detail to simulate the practical work. Due to Exponent function facility we can utilize it to solve directional track trace of missile. Through comparing with them we try to look for relation between them. In general simple trace with linear trace is easy to obtain aim scope but its precision is low. Meantime the exponential trace is hard to control but it can raise the track precision. Once we put condition such as parameters of n and K track is controlled and proceeded precise track trace of aim. In air to surface or ship missile the position to attack aim is very important so that it is simulated for us to judge the precise attack position in this paper to find easy control method to control missile track trace is our destination and aim.

2 Simulation and discussion

2. 1 Simple equation

It is supposed that

$$Y = aX + b \quad (1)$$

Let O(X_0,Y_0); point C(X_1,Y_1), here

X_0=0,Y_0=0; X_1=L,Y_1=H.

Let these points replace (1) and obtain

$$a = \frac{H-b}{L^2} (2), \quad b = 0 (3)$$

H is the missile height; L is the horizon distance to objection. a and b is coefficient.

2.2 Exponential equation

It is supposed that

$$Y = KX^n + C \quad (4)$$

Let O(X_0,Y_0); point 1(X_1,Y_1); point2(X_2,Y_2), here

X_0=0,Y_0=0; X_1=L,Y_1=H1; X_2=L,Y_2=H2

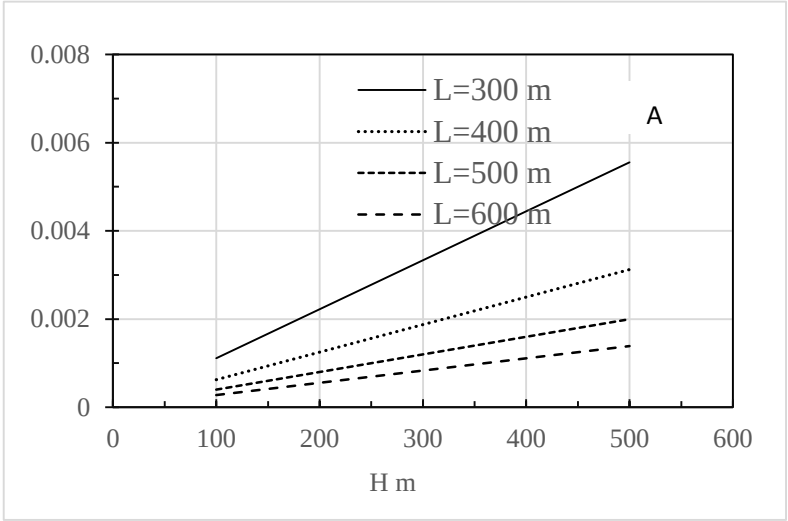
Let these points replace (7) and obtain

$$n = \frac{LN(H_1/H_2)}{LN(L_1/L_2)} \quad (5)$$

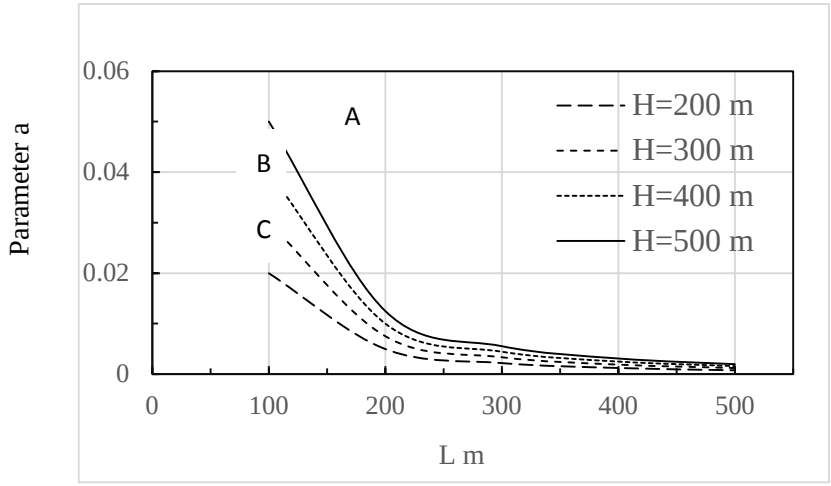
$$LNK = LNH_1 - \frac{LN(H_1/H_2)}{LN(L_1/L_2)} LNL_1 \quad (6)$$

Table1 n &K and L1 &L2 and H1 &H2 conditions.

No. / L& H	1	Adopted parameters
L2,m	400~600m	n, variable
L2,m	50~250m	K, variable
H2,m	300m	n, K
H1,m	400m	n, K
L1,m	50~250m	K, x
L1,m	100~500m	n, x

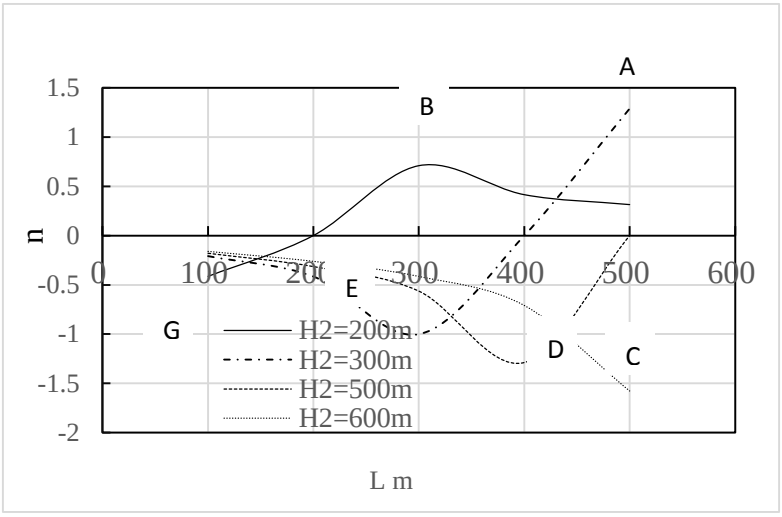


(a) H and a



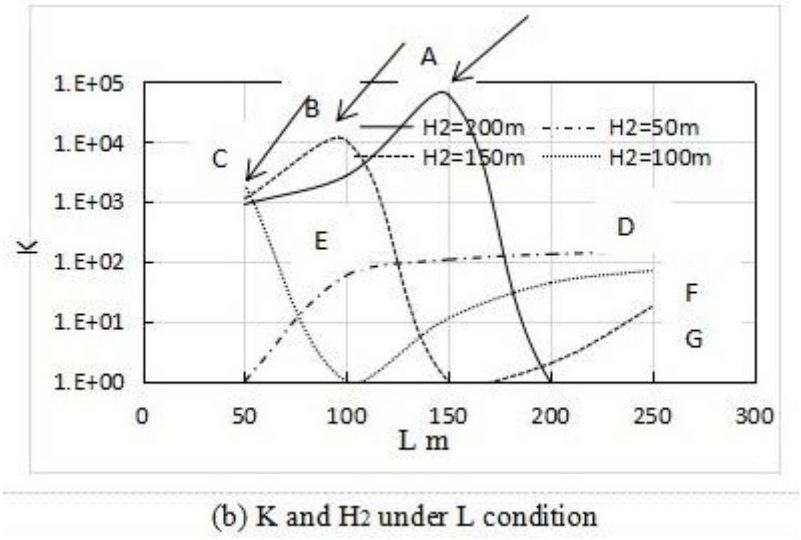
(b) L and a

Figure 1 parameters of a in simple equation at missile attack



(a) n and H2 under L condition in exponential equation

Table 1 represents the adopted parameters' condition of height H1, 2 and length L1, 2 for inference. It is used that different method in parameters n and K in exponential equation of missile track trace. As seen in Figure 4（a）the A, B and C is concluded as below. The longitudinal 500m has the biggest n at the A in exponential equation, expresses the best distance for missile attack. And then 300m at the B has second biggest K expresses the second best distance. In general the transverse 300m is the biggest n, expresses the best height for attack and them 200m. 600m, 500m at last 300m is the height which is better position in turn. It is said that the bigger n has better control function. So that the best point is A point with length of 500m and height of 300m. The second point is B with length of 300m and height of 200m and then The rest turn is C、D、E and G which coordinate is (500m,600m) 、 (400m,500m) 、 (300m,300m)&(100m,200m). n is basal factor to be considered according to super plastic behavior with the exponential equation. So it must be put basal position in exponential equation. And then the K is considered as bigger factor discussed as below.



(b) K and H2 under L condition

Figure 2 parameter a in exponential equation at missile attack.

From Figure 1(a,b) the H is big the a is same too meanwhile the a is small if H is big. From Figure1 it is shown that with big L a is big and at 200m the is bigger at 300m which is summit then it slowly become small. Meanwhile, with big L a is big too which is down slowly. The track will be long too, expresses the big orbit will be controlled by parameter. If a waves in a certain field the control will be easy to attain. A will indirectly control L so as to control H. If a is big from 0.5 to 2.5 the H would have been big too to attain. In general the parameter a will be better with a low value. From Figure 1(a) it is observed that with increasing height the will be high so that the low height is more available when it is low in linear track. At the point A the coordinate (500H, 300L) is the best position for missile track. But from Figure 1(b) it is known that the one below 200 length is high so that the length must be more than 200m at least the missile can be controlled to attack target accurately and firmly by plane. In 200m of length the preparation is available enough so it is in charge of the accuracy firmly. At the point A the coordinate (100L, 500H) is the best position for missile track. And then at the B it is (200L, 500H) which is second best position. In general the height of 500m is the best height and length is 100m and 300m. At the B, C and D it is (100L, 400H), (100L, 300H) and (100L, 200H) which is rest best position turn. A then the length is 200m which is better one. The middle one is B and C which is considered the best attack position for missile. It says that length of 100m and height of 300m and 400m is the predicted best positions in simple linear equation.

As seen in Figure 2（b）A, B and C point is explained as below. The longitudinal 150m at the A has the biggest K in exponential equation, expresses the best distance for missile attack. And then 100m has second biggest K at the B expresses the second best distance. The third one is 50m at the C. In general the transverse 200m is the biggest K, expresses the best height for attack. And then 150m、100m and at last 50m is the height which is best position in turn. So that the best point is a point with length of 150m and height of 150m. The second point is B with length of 100m and height of 150m and then third point is C which length is 50m and height is 100m. The rest turn is D、E、F and G which coordinate is (250m,50m)、(100m,50m)、(250m,100m) &(250m, 150m). It is considered that these two factors could be combined together to define the best position for missiles to proceed attack. In detail only the combined data should be observed and deduced can we judge the best position for missiles to take an aggression. According to K>n principle we could judge the position to attack aims. It is needed to have experiment to judge it. As we knew there are big

change in K according to simulation. It should be judged that easy control method to adopt in terms of experiment. Not to know many but to no one can we control the parameters for best attack position because a pilot doesn't know more positions to confuse his judge in exponential equation of track trace. Certainly the detailed judge need to be according to dynamics and kinetics and automatic control of plane speed, missile gravity and promoting force.

3. Conclusions

From above two methods it is simulated that relation between n、K and H、L with simple and exponential equation. According to H and L the n and K is determined and its curve is made to observe respectively. L equation usually is linear while H equation is curve. The accuracy is the finest at parameter K of exponential equation while it is the lowest at simple equation and parameter n of its equation. The length of 100m and height of 300m and 400m is the predicted best positions in simple linear equation. The length of 500m and height of 300m is the best position in exponential equation. And then the length of 300m and height of 200m is the second best position in it too.

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