**5. Homogeneous coherent burst signal**

The ambiguity diagram of Homogeneous coherent burst signal is bed-of-spikes. We can change the diagram to drawing-pin by adding other modulated signal. This kind of signal can get more sustained action time while not reducing bandwidth of transmitted signal and we will get signal with larger time-bandwidth product. Homogeneous coherent burst signal, which has great resolution of distance and vertical, is widely used in the radar signal. The waveform parameter of this kind of signal is easy to control which makes it suitable to be adaptive radar transmitted signal.

5.1 representation of complex envelope in time domain

The width of signal pulse is. The PRI is. The number of pulse is. The length is. Figure5.1 represents the waveform of a homogeneous coherent burst signal and the formula5.1 represents definition of a normalized pulse.



Figure5.1

 (5.1)

If adjoined pulse is coherent the representation of complex envelope of normalized homogeneous coherent burst signal is:

 (5.2)

 is the complex envelope representation of the sub-pulse.  is the period time of sub-pulse.  is the number and ,often an integer multiple of ,is the width.

From the property of  function we can rewrite the formula5.2 as:

 (5.3)

Make the complex envelope of sub-pulse:

 (5.4)

5.2 mathematical expression of ambiguity function

Considered the property of ambiguity function the mathematical expression of Time-Frequency autocorrelation function of homogeneous coherent burst signal can be write as :

(5.5)

 is Time-Frequency autocorrelation function of sub-pulse.

If the p is negative formula (5.5) can be rewrite as:

(5.6)

P divides the function to two pieces. When p is negative the Time-Frequency autocorrelation function of sub-pulse  is weighted stacking by factor . When p is active function weighted stacking by factor . The shift of  in time-delay axis depends on p and is integer multiple of  for p being an int.

Considered both  and  we can get when  the weighing factor of  can be write as



(5.7)

When  the weighing factor of  can be write as

（5.8）

The ambiguity function of homogeneous coherent burst signal is

 (5.10)

is the ambiguity function of sub-pulse.

We can get from (5.10) ambiguity function of homogeneous coherent burst signal is constituted by weighted  which is decided by ambiguity function of sub-pulse  while different p.

Make  in (5.10), the mathematical express of distance ambiguity function is

 (5.11)

Make, the mathematical express of speed ambiguity function is

 (5.12)

5.3 Result of simulation and analysis

5.3.1Waveform of signal

Use Matlab to simulate the curves of real part and imaginary part of homogeneous coherent burst signal and the amplitude-frequency characteristic. The frequence of carrier wave is .PRI is . Number of pulse is .Initial phase is . The result of simulation is presented as figure 5.2 and 5.3



Figure5.2



Figure5.3