**Proof of GeLSA Theory**

**(1)Process of the LSA algorithm**:

For

Obtain:

;

Set the following variables:

;

;

**(2)Process of the GeLSA algorithm:**

For

Set the following variables:

;

(3)To prove the correctness of the GeLSA algorithm, it is sufficient to demonstrate that, which is equivalent to showing:

Firstly, we verify the case when  that is;

This serves as the initial step in our verification process.

;

;

Clearly, based on the derivation formulas of and , it can be concluded that both functions are the result of summing a continuous segment of . Therefore, .

(4)We now proof:that is:;

To supplement, we can observe that: are two polygonal chains.

where the zeros ofare:

,represents a curve from ;

It suffices to prove that: In other words, the curve

(5)We proof in hear:

are the zeros of ;

We can obtain:

Situation(1):

Because so:

Situation(2):

We can obtain:

;and:

so,

So:

Situation(3): ;

We may derive:

In summary situation(1-3), the collective evidence demonstrates that

By an analogous argument, we may prove that;

So:;In other words, the curve

So, ; that is

(5)Therefore, based on (3)-(5), we can conclude that ;

The same process can be used to prove

So ;

Therefore, since the computational results of LSA and GeLSA are identical, the correctness of GeLSA is verified.