Assuming the ideal truncate physiological signal is, the ideal continuous quasi-periodicity physiological signal is, and the rectangular window function is. The model of the ideal truncate physiological signal can be expressed thus:

 (1)

and

 (2)

Here, represents the entire dispersed point number in the window and  represents the sequence of each sample regarding physiological signal.

The first autocorrelation can be expressed thus:

 (3)

and  are independent, according the characteristic of expectation, the equation (3) can be expressed into:

 (4)

Here, is the correlation of, and  is the correlation of.

And

 (5)

The autocorrelation of  can be expressed as:

 (6)

Here, is the correlation of and is the correlation of.

And

 (7)

Analogously, the autocorrelation of  can be expressed as:

 (8)

Here, is the correlation of  and is the correlation of.

And

 (9)

Where

 (10)

And

 (11)

The coefficient matrix of appears in Table 1, while the coefficient matrix of  is shown in Table 2. The normalized curve of the derived equation (9) is called the signal quality management (SQM) curve.

Table 1

coefficient matrix of 

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | *i=0* | *i=1* | *i=2* | *i=3* |
|  | c2 | bc | 0 | ac |
|  | 2bc | b2 | 3ac | ab |
|  | b2 | 3ac | 3ab | 0 |
|  | 2ac | 4ab | 0 | a2 |
|  | 2ab | 0 | 3a2 | 0 |
|  | 0 | 3a2 | 0 | 0 |
|  | a2 | 0 | 0 | 0 |



Table 2

coefficient matrix of 

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | i=0 | i=1 | i=2 | i=3 | i=4 | i=5 | i=6 | i=7 |
|  | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | 0 | 1/2 | 1/2 | 0 | 0 | 0 | 0 | 0 |
|  | 0 | 1/6 | 1/2 | 1/3 | 0 | 0 | 0 | 0 |
|  | 0 | 0 | 1/4 | 1/2 | 1/4 | 0 | 0 | 0 |
|  | 0 | 0 | -1/30 | 1/3 | 1/2 | 1/5 | 0 | 0 |
|  | 0 | 0 | -1/12 | 0 | 5/12 | 1/2 | 1/6 | 0 |
|  | 0 | -1/42 | 0 | -1/6 | 0 | 1/2 | 1/2 | 1/7 |