

## Average Squared Difference Function

$$E_i(L) \geq 2H_i(L)$$

and that  $E_i(L)$  is nearly equal to  $2H_i(L)$  only at values of  $L$  that are periods of repetition of the data. Because the scaling of the data,  $\{x_j\}$ , is unknown, the term “nearly” must be interpreted relative to the energy of the signal. This results in a threshold test for detecting periodicity:

$$E_i(L) - 2H_i(L) \leq \text{eps } E_i(L) \quad (6)$$

where “eps” is a small number. When this condition is satisfied by varying the value of  $L$ , then  $L$  is a period of repetition of the data.

- $E$  represents the “energy” of the signal
- $H$  represents the actual auto-correlation result
- Idea is that  $E$  would be “perfect” auto-correlation, so  $E - 2 * H$  should be very close to zero
- In the patent “very close” is defined as epsilon (a convention from maths), between 0 and 0.4
- This gives a consistent measure of how periodic the signal is at any given time, *independent of amplitude*
- Anything greater than epsilon (i.e. 0.4) is classed as not periodic

**Example of ASDF on audio file**

