

```

1 /* slowFT-linear-lowSpace.c, by S. Tanaka, 2006 */
2 #include <math.h>
3 #include <stdio.h>
4 #include <time.h>
5
6 #define twoPi 3.1415926535 * 2.0
7 #define N      512
8
9 FILE *fpW;
10 FILE *fopen();
11
12 void main( void )
13 {
14     int    t, fn, j;
15     double dataR[N], dataI[N];
16     double wR[N], wI[N], DataR[N], DataI[N];
17     double ffR, ffI, power;
18
19     double start, finish;
20
21     start=clock();
22     for (t=0; t<N; t++) {
23         dataR[t] = 1.0* cos(2*twoPi*t/N)
24             +1.0* cos(4*twoPi*t/N); /* データの生成 */
25         dataI[t] = 0.0;
26         wR    [t] = cos(twoPi*t/N);
27         wI    [t] = -sin(twoPi*t/N);
28     }
29     for (fn=0; fn<N; fn++) {
30         ffR = dataR[0];
31         ffI = dataI[0];
32         j   = 0;
33         for (t=1; t<N; t++) {
34             j = (j + fn) % N; /* 回転因子乗数の法則性 */
35             ffR = ffR + dataR[t]*wR[j] - dataI[t]*wI[j]; /* 実数部乗算後足込み */
36             ffI = ffI + dataR[t]*wI[j] + dataI[t]*wR[j]; /* 虚数部乗算後足込み */
37         }
38         DataR[fn] = ffR;
39         DataI[fn] = ffI;
40     }
41     finish=clock();
42
43     fpW = fopen("slowFT-linear-lowSpace.txt", "w");
44     fprintf(fpW, "          離散フーリエ変換¥n");
45     fprintf(fpW, "t,fn    f(t)          Re(F(fn))  Im(F(fn))  振幅¥n");
46
47     for (fn=0; fn<N; fn++) {
48         power = DataR[fn]*DataR[fn] + DataI[fn]*DataI[fn];
49         fprintf(fpW, " %3d %10.6f %10.6f %10.6f %10.6f ¥n",
50             fn, dataR[fn], DataR[fn], DataI[fn], power);
51     }
52     printf("Elapse time: %lf seconds!¥n", (double)(finish-start)/CLOCKS_PER_SEC);
53     printf("Result written to 'slowFT-linear-lowSpace.txt.'¥n");
54 }
55 }

```