

TABLE OF ROTATION SEQUENCES OF  $x_{n+1} = x_n^2 - \lambda$

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ABSTRACT

Symbolic table is presented for the periodic orbits of the iterates of  $x_{n+1} = x_n^2 - \lambda$ . This provides some useful informations about the periodic points in the Smale's horseshoe map and will be applied to the bifurcation problems of periodic points in the Hénon map.

1. INTRODUCTION

This note provides only a table of rotation sequences correlated with the periodic orbits in a map:

$$f: \mathbb{R} \rightarrow \mathbb{R}; x \rightarrow f(x) = x^2 - \lambda \quad (1)$$

where  $\lambda$  is a real parameter. Since Myrberg's pioneering work [1], many authors discuss about the iterations of (1), see for example [2][3]. For  $\lambda > 2$  all possible periodic points of (1) are generated. Hence there exists an isomorphism of periodic points between the Smale's horseshoe map and the map (1). The periodic points of (1) can be naturally imbedded in a horseshoe rectangle region. This fact is effectively used for the discussion of the bifurcation problems of the periodic points in the Hénon map[4][5].

Combinatorial algorithm for obtaining the rotation sequence is reported in [6]. The algorithm can be easily implemented in a small computer. Tables and imbedded figures of the rotation sequences are illustrated in [7]. Listings of computer program in Basic are also found in [7].

## 2. NOTATIONS

There are many notations and symbols to specify the periodic orbits of (1)[2][3]. Here we show the symbols used in our table in §3 by an illustrated example of a 6-periodic orbit with the multiplier  $S = 0$ , called a critical orbit, shown in Fig. 1. The periodic points are numbered consecutively in decimal with the increasing order of  $x$ . By the iteration of (1), the point 1 moves as follows:

$$1 \rightarrow 6 \rightarrow 4 \rightarrow 2 \rightarrow 5 \rightarrow 3 \rightarrow 1 \quad (2)$$

The decimal sequence of the orbit is then expressed by  $[d] = 164253$ . Note that the point 3 lies on the minimum point  $x = 0$ . Assigning + sign to the points 4, 5, 6 and - sign to 1, 2, and starting from the point 1, we obtain a binary sequence  $[-++-+]$ , where the sign does not assign to the point 3. In this sequence the first symbol is always - sign so that omitting it Myrberg introduced the binary rotation sequence  $[r] = [++-+]$ , which we call the rotation sequence of Myrberg. Note that the value of the parameter  $\lambda$  giving  $S = 0$  is called the critical value of  $\lambda$ . Note also that the alphabet  $\{-, +\}$  is written by  $\{L, R\}$  in [3].

From the rotation sequence of Myrberg  $[r]$  we obtain two kinds of noncritical rotation sequences:  $[++-+]$  and  $[++-+]$ , where the last sign + or - is attached to  $[r]$ . This corresponds to the splitting of the point 3 into the positive or negative direction of  $x$ . The rotation sequences are also rewritten by the alphabet  $\{1, 0\}$ :

$$a_0 = [1001001], a_1 = [1001011] \quad (3)$$

where we write down full symbols with 6 bits, that is the first and last signs are attached to  $[r]$  with  $\{1, 0\}$ .

Now if we consider the standard shift transformation applied to the repeated sequences of (3):  $\cdots aa.aa \cdots$ , the periodic points of (3) can be easily imbedded in a horseshoe rectangle as illustrated in Fig. 2, where the point moves along the directional segment by the horseshoe map. Note that the rectangle is symbolically coordinated by the binary numbers shown in Fig. 3. The rotation sequence imbedded in the rect-

angle is called *symmetric* if the orbit is symmetric with respect to the diagonal line shown in Fig. 3. If a rotation sequence is dissymmetric, then there exists another dissymmetric sequence called the adjoint sequence. They have a symmetric property with respect to the diagonal line in Fig. 3.

Finally a periodic point in the rectangle is directly unstable if  $0 < S_1 < 1 < S_2$ , and is inversely unstable if  $S_1 < -1 < S_2 < 0$ , where  $S_1$  and  $S_2$  denote the multiplier of the periodic point.

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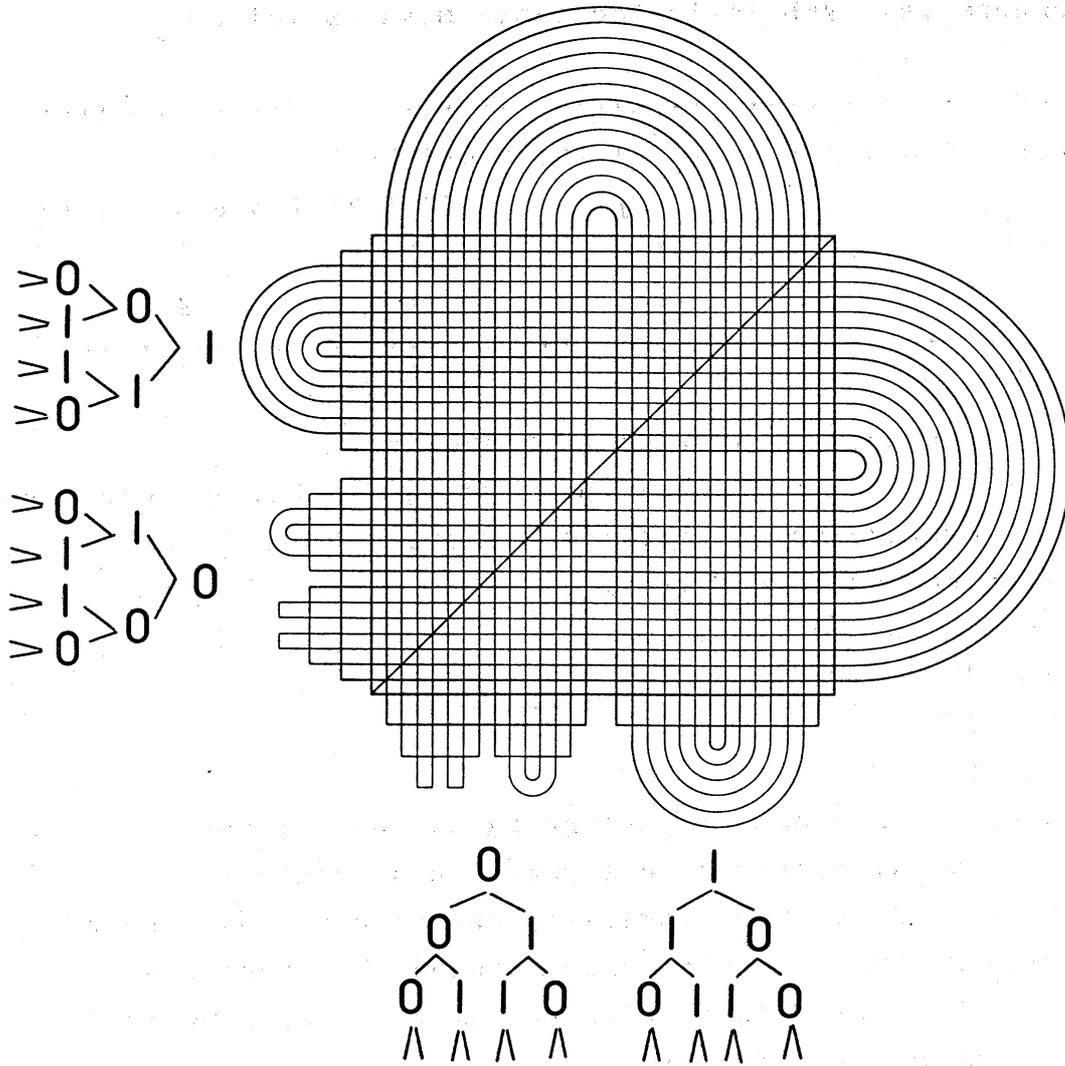


Fig. 3. Horseshoe rectangle and its binary coordinate.

## 3. TABLE OF ROTATION SEQUENCES

Numbers and symbols in the table mean as follows:

```

.....
2  1.77289  1 6 4 2 5 3 [++-+] 10010 0(S-D-2)
                                     1(D-I-2) 1 6 5 3 2 4 (3)
↑      ↑           ↑           ↑           ↑           ↑           ↑
a      b           c           d           e           f           g
.....

```

a: consecutive number of rotation sequence.

b: critical value  $\lambda$  for obtaining Myrberg's rotation sequence.

c: decimal expression of rotation sequence.

d: rotation sequence of Myrberg.

e: binary expression of (3).

f: 0 ( S - D - 2 )

↑ ↑ ↑ ↑

$f_1$   $f_2$   $f_3$   $f_4$

$f_1$ : 0 or 1: the last bit assigning to the expression (e).

$f_2$ : S or D: symmetric or dissymmetric sequence.

$f_3$ : D or I: directly or inversely unstable periodic point.

$f_4$ : winding number of the orbit around the inversely unstable fixed point corresponding to the repeated sequence  $\cdots 1111.1111 \cdots$ .

g: adjoint sequence when the sequence is dissymmetric.



8 1.9171 1 8 7 4 2 6 3 5[+---+ ]1001101 0(D-D-3) 1 8 6 3 5 2 7 4 ( 5 )  
1(D-I-3) 1 8 6 3 4 2 7 5 ( 6 )  
9 1.94178 1 8 6 4 2 7 5 3[+++ + ]1000100 0(S-D-2)  
1(D-I-2) 1 8 7 5 3 2 6 4 ( 12 )  
10 1.96076 1 8 7 5 2 6 3 4[+++ + ]1000101 0(S-I-3)  
1(D-D-3) 1 8 7 6 3 4 2 5 ( 11 )  
11 1.9722 1 8 7 6 3 4 2 5[+++ - ]1000111 0(D-D-3) 1 8 7 5 2 6 3 4 ( 10 )  
1(S-I-3)  
12 1.98166 1 8 7 5 3 2 6 4[+++ + ]1000110 0(D-I-2) 1 8 6 4 2 7 5 3 ( 9 )  
1(S-D-2)  
13 1.98879 1 8 7 6 4 2 5 3[+++ + ]1000010 0(S-D-2)  
1(D-I-2) 1 8 7 6 5 3 2 4 ( 14 )  
14 1.99433 1 8 7 6 5 3 2 4[+++ - ]1000011 0(D-I-2) 1 8 7 6 4 2 5 3 ( 13 )  
1(S-D-2)  
15 1.99796 1 8 7 6 5 4 2 3[++++ ]1000001 0(S-D-2) 1(S-I-2)  
16 1.99977 1 8 7 6 5 4 3 2[++++ ]1000000 0(S-I-1) 1(S-D-1)

----- Order of rotation sequence = 9 , Number of rotation sequences = 28 -----

1 1.55528 1 9 5 4 6 3 7 2 8[+-----]10111111 0(S-I-4) 1(S-D-4)  
2 1.59568 1 9 5 4 6 2 8 3 7[+-----]10111101 0(S-D-4) 1(S-I-4)  
3 1.65613 1 9 5 3 7 2 8 4 6[+---+ ]10110101 0(S-I-4)  
1(D-D-4) 1 9 6 2 8 4 5 3 7 ( 4 )  
4 1.69014 1 9 6 2 8 4 5 3 7[+---+ ]10110111 0(D-D-4) 1 9 5 3 7 2 8 4 6 ( 3 )  
1(S-I-4)  
5 1.78587 1 9 6 3 7 4 2 8 5[++++ ]10010110 0(D-D-3) 1 9 7 4 3 6 2 8 5 ( 11 )  
1(D-I-3) 1 9 8 5 2 7 4 3 6 ( 12 )  
6 1.82276 1 9 7 2 8 4 5 3 6[++++ ]10010111 0(S-I-4)  
1(D-D-4) 1 9 8 4 5 3 6 2 7 ( 9 )  
7 1.84129 1 9 7 3 6 2 8 4 5[++++ ]10010101 0(S-D-4)  
1(D-I-4) 1 9 8 4 5 2 7 3 6 ( 8 )  
8 1.87838 1 9 8 4 5 2 7 3 6[++++ ]10011101 0(D-I-4) 1 9 7 3 6 2 8 4 5 ( 7 )  
1(S-D-4)  
9 1.89078 1 9 8 4 5 3 6 2 7[+-----]10011111 0(D-D-4) 1 9 7 2 8 4 5 3 6 ( 6 )  
1(S-I-4)  
10 1.90312 1 9 7 4 3 5 2 8 6[++++ ]10011110 0(S-I-3)  
1(D-D-3) 1 9 8 5 2 7 4 3 6 ( 12 )  
11 1.91144 1 9 7 4 3 6 2 8 5[++++ ]10011010 0(D-D-3) 1 9 6 3 7 4 2 8 5 ( 5 )  
1(S-I-3)  
12 1.92229 1 9 8 5 2 7 4 3 6[++++ ]10011011 0(D-I-3) 1 9 6 3 7 4 2 8 5 ( 5 )  
1(D-D-3) 1 9 7 4 3 5 2 8 6 ( 10 )  
13 1.93224 1 9 7 4 2 8 6 3 5[++++ ]10011001 0(S-D-3) 1(S-I-3)  
14 1.94958 1 9 7 5 2 8 6 3 4[++++ ]10001001 0(D-I-3) 1 9 8 6 3 5 2 7 4 ( 16 )  
1(D-D-3) 1 9 8 6 3 4 2 7 5 ( 17 )  
15 1.95733 1 9 8 6 2 7 4 3 5[++++ ]10001011 0(S-D-3)  
1(D-I-3) 1 9 8 7 4 3 5 2 6 ( 18 )  
16 1.96402 1 9 8 6 3 5 2 7 4[++++ ]10001010 0(D-I-3) 1 9 7 5 2 8 6 3 4 ( 14 )  
1(D-D-3) 1 9 8 7 4 2 6 3 5 ( 19 )  
17 1.96942 1 9 8 6 3 4 2 7 5[++++ ]10001110 0(D-D-3) 1 9 7 5 2 8 6 3 4 ( 14 )  
1(D-I-3) 1 9 8 7 4 2 6 3 5 ( 19 )  
18 1.97478 1 9 8 7 4 3 5 2 6[++++ ]10001111 0(D-I-3) 1 9 8 6 2 7 4 3 5 ( 15 )  
1(S-D-3)  
19 1.97946 1 9 8 7 4 2 6 3 5[++++ ]10001101 0(D-D-3) 1 9 8 6 3 5 2 7 4 ( 16 )  
1(D-I-3) 1 9 8 6 3 4 2 7 5 ( 17 )



|    |         |                               |           |                      |  |
|----|---------|-------------------------------|-----------|----------------------|--|
| 22 | 1.93539 | 1 10 8 5 2 9 7 4 3 6[+--+---] | 100110011 | 0(D-I-3)<br>1(S-D-3) | 1 10 7 4 2 9 6 3 8 5 ( 21 )                                |
| 23 | 1.94687 | 1 10 8 6 2 9 7 4 3 5[+++----] | 100010011 | 0(D-D-3)<br>1(D-I-3) | 1 10 9 6 3 7 4 2 8 5 ( 25 )<br>1 10 9 7 4 3 5 2 8 6 ( 32 ) |
| 24 | 1.9519  | 1 10 8 5 2 9 6 3 7 4[+++----] | 100010010 | 0(S-I-3)<br>1(D-D-3) | 1 10 9 7 4 3 6 2 8 5 ( 33 )                                |
| 25 | 1.95542 | 1 10 9 6 3 7 4 2 8 5[+++----] | 100010110 | 0(D-D-3)<br>1(D-I-3) | 1 10 8 6 2 9 7 4 3 5 ( 23 )<br>1 10 9 8 5 2 7 4 3 6 ( 34 ) |
| 26 | 1.9591  | 1 10 9 7 2 8 4 5 3 6[+++----] | 100010111 | 0(S-I-4)<br>1(D-D-4) | 1 10 9 8 4 5 3 6 2 7 ( 31 )                                |
| 27 | 1.96238 | 1 10 9 7 3 6 2 8 4 5[+++----] | 100010101 | 0(S-D-4)<br>1(D-I-4) | 1 10 9 8 4 5 2 7 3 6 ( 30 )                                |
| 28 | 1.96582 | 1 10 8 6 3 5 2 9 7 4[+++----] | 100010100 | 0(S-I-3)<br>1(D-D-3) | 1 10 9 7 4 2 8 6 3 5 ( 35 )                                |
| 29 | 1.96774 | 1 10 8 6 3 4 2 9 7 5[+++----] | 100011100 | 0(S-D-3)<br>1(D-I-3) | 1 10 9 7 4 2 8 6 3 5 ( 35 )                                |
| 30 | 1.97086 | 1 10 9 8 4 5 2 7 3 6[+++----] | 100011101 | 0(D-I-4)<br>1(S-D-4) | 1 10 9 7 3 6 2 8 4 5 ( 27 )                                |
| 31 | 1.9735  | 1 10 9 8 4 5 3 6 2 7[+++----] | 100011111 | 0(D-D-4)<br>1(S-I-4) | 1 10 9 7 2 8 4 5 3 6 ( 26 )                                |
| 32 | 1.97604 | 1 10 9 7 4 3 5 2 8 6[+++----] | 100011110 | 0(D-I-3)<br>1(D-D-3) | 1 10 8 6 2 9 7 4 3 5 ( 23 )<br>1 10 9 8 5 2 7 4 3 6 ( 34 ) |
| 33 | 1.97829 | 1 10 9 7 4 3 6 2 8 5[+++----] | 100011010 | 0(D-D-3)<br>1(S-I-3) | 1 10 8 5 2 9 6 3 7 4 ( 24 )                                |
| 34 | 1.98058 | 1 10 9 8 5 2 7 4 3 6[+++----] | 100011011 | 0(D-I-3)<br>1(D-D-3) | 1 10 9 6 3 7 4 2 8 5 ( 25 )<br>1 10 9 7 4 3 5 2 8 6 ( 32 ) |
| 35 | 1.98272 | 1 10 9 7 4 2 8 6 3 5[+++----] | 100011001 | 0(D-D-3)<br>1(D-I-3) | 1 10 8 6 3 5 2 9 7 4 ( 28 )<br>1 10 8 6 3 4 2 9 7 5 ( 29 ) |
| 36 | 1.98548 | 1 10 8 6 4 2 9 7 5 3[+++++++] | 100001000 | 0(S-D-2)<br>1(D-I-2) | 1 10 9 7 5 3 2 8 6 4 ( 43 )                                |
| 37 | 1.98794 | 1 10 9 7 5 2 8 6 3 4[+++++++] | 100001001 | 0(D-I-3)<br>1(D-D-3) | 1 10 9 8 6 3 5 2 7 4 ( 39 )<br>1 10 9 8 6 3 4 2 7 5 ( 40 ) |
| 38 | 1.9896  | 1 10 9 8 6 2 7 4 3 5[+++++++] | 100001011 | 0(S-D-3)<br>1(D-I-3) | 1 10 9 8 7 4 3 5 2 6 ( 41 )                                |
| 39 | 1.99112 | 1 10 9 8 6 3 5 2 7 4[+++++++] | 100001010 | 0(D-I-3)<br>1(D-D-3) | 1 10 9 7 5 2 8 6 3 4 ( 37 )<br>1 10 9 8 7 4 2 6 3 5 ( 42 ) |
| 40 | 1.99248 | 1 10 9 8 6 3 4 2 7 5[+++++++] | 100001110 | 0(D-D-3)<br>1(D-I-3) | 1 10 9 7 5 2 8 6 3 4 ( 37 )<br>1 10 9 8 7 4 2 6 3 5 ( 42 ) |
| 41 | 1.99375 | 1 10 9 8 7 4 3 5 2 6[+++++++] | 100001111 | 0(D-I-3)<br>1(S-D-3) | 1 10 9 8 6 2 7 4 3 5 ( 38 )                                |
| 42 | 1.99489 | 1 10 9 8 7 4 2 6 3 5[+++++++] | 100001101 | 0(D-D-3)<br>1(D-I-3) | 1 10 9 8 6 3 5 2 7 4 ( 39 )<br>1 10 9 8 6 3 4 2 7 5 ( 40 ) |
| 43 | 1.99592 | 1 10 9 7 5 3 2 8 6 4[+++++++] | 100001100 | 0(D-I-2)<br>1(S-D-2) | 1 10 8 6 4 2 9 7 5 3 ( 36 )                                |
| 44 | 1.9968  | 1 10 9 8 6 4 2 7 5 3[+++++++] | 100000100 | 0(S-D-2)<br>1(D-I-2) | 1 10 9 8 7 5 3 2 6 4 ( 47 )                                |
| 45 | 1.99761 | 1 10 9 8 7 5 2 6 3 4[+++++++] | 100000101 | 0(S-I-3)<br>1(D-D-3) | 1 10 9 8 7 6 3 4 2 5 ( 46 )                                |
| 46 | 1.99829 | 1 10 9 8 7 6 3 4 2 5[+++++++] | 100000111 | 0(D-D-3)<br>1(S-I-3) | 1 10 9 8 7 5 2 6 3 4 ( 45 )                                |
| 47 | 1.99886 | 1 10 9 8 7 5 3 2 6 4[+++++++] | 100000110 | 0(D-I-2)<br>1(S-D-2) | 1 10 9 8 6 4 2 7 5 3 ( 44 )                                |
| 48 | 1.99931 | 1 10 9 8 7 6 4 2 5 3[+++++++] | 100000010 | 0(S-D-2)<br>1(D-I-2) | 1 10 9 8 7 6 5 3 2 4 ( 49 )                                |

49 1.99965 1 10 9 8 7 6 5 3 2 4[+++++--]100000011 0(D-I-2) 1 10 9 8 7 6 4 2 5 3 ( 48 )  
 1(S-D-2)  
 50 1.99987 1 10 9 8 7 6 5 4 2 3[+++++--]100000001 0(S-D-2) 1(S-I-2)  
 51 1.99999 1 10 9 8 7 6 5 4 3 2[+++++--]100000000 0(S-I-1) 1(S-D-1)

----- Order of rotation sequence = 11 , Number of rotation sequences = 93 -----

1 1.5479 1 11 6 5 7 4 8 3 9 2 10[+-----]1011111111 0(S-I-5) 1(S-D-5)  
 2 1.56363 1 11 6 5 7 4 8 2 10 3 9[+-----+ ]1011111101 0(S-D-5) 1(S-I-5)  
 3 1.5868 1 11 6 5 7 3 9 2 10 4 8[+----+--+ ]1011110101 0(S-I-5)  
 1(D-D-5) 1 11 6 4 8 2 10 5 7 3 9 ( 4 )  
 4 1.60431 1 11 6 4 8 2 10 5 7 3 9[+----+---]1011110111 0(D-D-5) 1 11 6 5 7 3 9 2 10 4 8 ( 3 )  
 1(S-I-5)  
 5 1.64871 1 11 7 3 9 2 10 5 6 4 8[+---+----]1011010111 0(S-I-5)  
 1(D-D-5) 1 11 8 2 10 5 6 4 7 3 9 ( 8 )  
 6 1.66311 1 11 6 3 9 4 8 2 10 5 7[+---+--+ ]1011010101 0(S-D-5)  
 1(D-I-5) 1 11 7 2 10 5 6 3 9 4 8 ( 7 )  
 7 1.68452 1 11 7 2 10 5 6 3 9 4 8[+---+----]1011011101 0(D-I-5) 1 11 6 3 9 4 8 2 10 5 7 ( 6 )  
 1(S-D-5)  
 8 1.69524 1 11 8 2 10 5 6 4 7 3 9[+---+----]1011011111 0(D-D-5) 1 11 7 3 9 2 10 5 6 4 8 ( 5 )  
 1(S-I-5)  
 9 1.73201 1 11 7 2 10 6 3 9 5 4 8[+---+----]1011011011 0(S-I-4) 1(S-D-4)  
 10 1.79606 1 11 8 2 10 6 3 9 5 4 7[+---+----]1001011011 0(S-D-4)  
 1(D-I-4) 1 11 9 5 4 7 2 10 6 3 8 ( 27 )  
 11 1.80821 1 11 8 3 9 5 4 7 2 10 6[+---+----]1001011010 0(S-I-4)  
 1(D-D-4) 1 11 10 6 3 8 2 9 5 4 7 ( 30 )  
 12 1.81177 1 11 8 3 9 5 4 6 2 10 7[+---+----]1001011110 0(D-D-4) 1 11 9 5 4 6 3 8 2 10 7 ( 26 )  
 1(D-I-4) 1 11 10 7 2 9 5 4 6 3 8 ( 33 )  
 13 1.81982 1 11 9 2 10 5 6 4 7 3 8[+---+----]1001011111 0(S-I-5)  
 1(D-D-5) 1 11 10 5 6 4 7 3 8 2 9 ( 24 )  
 14 1.8257 1 11 8 2 10 5 6 3 9 4 7[+---+----]1001011101 0(D-D-5) 1 11 9 3 8 2 10 5 6 4 7 ( 16 )  
 1(D-I-5) 1 11 9 4 7 2 10 5 6 3 8 ( 21 )  
 15 1.83868 1 11 8 3 9 4 7 2 10 5 6[+---+----]1001010101 0(S-I-5)  
 1(D-D-5) 1 11 10 5 6 3 8 2 9 4 7 ( 22 )  
 16 1.8438 1 11 9 3 8 2 10 5 6 4 7[+---+----]1001010111 0(D-D-5) 1 11 8 2 10 5 6 3 9 4 7 ( 14 )  
 1(D-I-5) 1 11 10 5 6 4 7 2 9 3 8 ( 23 )  
 17 1.84992 1 11 8 4 7 3 9 5 2 10 6[+---+----]1001010110 0(D-I-4) 1 11 9 5 3 8 4 7 2 10 6 ( 31 )  
 1(D-D-4) 1 11 10 6 2 9 5 3 8 4 7 ( 34 )  
 18 1.85376 1 11 8 4 6 2 10 7 3 9 5[+---+----]1001010010 0(S-D-4)  
 1(D-I-4) 1 11 9 5 3 7 2 10 8 4 6 ( 29 )  
 19 1.86808 1 11 8 4 5 2 10 7 3 9 6[+---+----]1001110010 0(S-I-4)  
 1(D-D-4) 1 11 9 5 3 7 2 10 8 4 6 ( 29 )  
 20 1.87171 1 11 8 4 5 3 9 6 2 10 7[+---+----]1001110110 0(D-D-4) 1 11 9 5 3 8 4 6 2 10 7 ( 32 )  
 1(D-I-4) 1 11 10 6 2 9 5 3 8 4 7 ( 34 )  
 21 1.87649 1 11 9 4 7 2 10 5 6 3 8[+---+----]1001110111 0(D-I-5) 1 11 8 2 10 5 6 3 9 4 7 ( 14 )  
 1(D-D-5) 1 11 10 5 6 4 7 2 9 3 8 ( 23 )  
 22 1.88025 1 11 10 5 6 3 8 2 9 4 7[+---+----]1001110101 0(D-D-5) 1 11 8 3 9 4 7 2 10 5 6 ( 15 )  
 1(S-I-5)  
 23 1.88915 1 11 10 5 6 4 7 2 9 3 8[+---+----]1001111101 0(D-I-5) 1 11 9 3 8 2 10 5 6 4 7 ( 16 )  
 1(D-D-5) 1 11 9 4 7 2 10 5 6 3 8 ( 21 )  
 24 1.89234 1 11 10 5 6 4 7 3 8 2 9[+---+----]1001111111 0(D-D-5) 1 11 9 2 10 5 6 4 7 3 8 ( 13 )  
 1(S-I-5)  
 25 1.89575 1 11 9 5 4 6 3 7 2 10 8[+---+----]1001111110 0(S-I-4)  
 1(D-D-4) 1 11 10 7 2 9 5 4 6 3 8 ( 33 )

26 1.89809 1 11 9 5 4 6 3 8 2 10 7[+-----+]1001111010 0(D-D-4) 1 11 8 3 9 5 4 6 2 10 7 ( 12 )  
 1(D-I-4) 1 11 10 6 3 8 2 9 5 4 7 ( 30 )  
 27 1.90149 1 11 9 5 4 7 2 10 6 3 8[+-----+]1001111011 0(D-I-4) 1 11 8 2 10 6 3 9 5 4 7 ( 10 )  
 1(S-D-4)  
 28 1.90503 1 11 9 5 4 6 2 10 8 3 7[+-----+]1001111001 0(S-D-4) 1(S-I-4)  
 29 1.90961 1 11 9 5 3 7 2 10 8 4 6[+-----+]1001101001 0(D-I-4) 1 11 8 4 6 2 10 7 3 9 5 ( 18 )  
 1(D-D-4) 1 11 8 4 5 2 10 7 3 9 6 ( 19 )  
 30 1.91297 1 11 10 6 3 8 2 9 5 4 7[+-----+]1001101011 0(D-D-4) 1 11 8 3 9 5 4 7 2 10 6 ( 11 )  
 1(D-I-4) 1 11 9 5 4 6 3 8 2 10 7 ( 26 )  
 31 1.916 1 11 9 5 3 8 4 7 2 10 6[+-----+]1001101010 0(D-I-4) 1 11 8 4 7 3 9 5 2 10 6 ( 17 )  
 1(S-D-4)  
 32 1.91819 1 11 9 5 3 8 4 6 2 10 7[+-----+]1001101110 0(D-D-4) 1 11 8 4 5 3 9 6 2 10 7 ( 20 )  
 1(S-I-4)  
 33 1.921 1 11 10 7 2 9 5 4 6 3 8[+-----+]1001101111 0(D-I-4) 1 11 8 3 9 5 4 6 2 10 7 ( 12 )  
 1(D-D-4) 1 11 9 5 4 6 3 7 2 10 8 ( 25 )  
 34 1.92359 1 11 10 6 2 9 5 3 8 4 7[+-----+]1001101101 0(D-D-4) 1 11 8 4 7 3 9 5 2 10 6 ( 17 )  
 1(D-I-4) 1 11 8 4 5 3 9 6 2 10 7 ( 20 )  
 35 1.93083 1 11 9 5 2 10 7 3 8 4 6[+-----+]1001100101 0(S-I-4)  
 1(D-D-4) 1 11 9 6 2 10 8 4 5 3 7 ( 36 )  
 36 1.93371 1 11 9 6 2 10 8 4 5 3 7[+-----+]1001100111 0(D-D-4) 1 11 9 5 2 10 7 3 8 4 6 ( 35 )  
 1(S-I-4)  
 37 1.93749 1 11 8 5 2 10 7 4 3 9 6[+-----+]1001100110 0(S-I-3) 1(S-D-3)  
 38 1.94499 1 11 9 6 2 10 7 4 3 8 5[+-----+]1000100110 0(S-D-3)  
 1(D-I-3) 1 11 10 7 4 3 8 5 2 9 6 ( 59 )  
 39 1.94833 1 11 9 7 2 10 8 4 5 3 6[+-----+]1000100111 0(D-I-4) 1 11 10 7 3 8 4 5 2 9 6 ( 45 )  
 1(D-D-4) 1 11 10 8 4 5 3 6 2 9 7 ( 52 )  
 40 1.95074 1 11 9 6 2 10 7 3 8 4 5[+-----+]1000100101 0(D-D-4) 1 11 10 7 3 8 4 6 2 9 5 ( 46 )  
 1(D-I-4) 1 11 10 8 4 5 3 7 2 9 6 ( 51 )  
 41 1.95326 1 11 9 6 3 8 5 2 10 7 4[+-----+]1000100100 0(S-I-3)  
 1(D-D-3) 1 11 10 7 4 2 9 6 3 8 5 ( 60 )  
 42 1.95417 1 11 9 6 3 7 4 2 10 8 5[+-----+]1000101100 0(D-D-3) 1 11 9 7 4 3 6 2 10 8 5 ( 56 )  
 1(D-I-3) 1 11 10 8 5 2 9 7 4 3 6 ( 61 )  
 43 1.95641 1 11 10 7 2 9 5 3 8 4 6[+-----+]1000101101 0(D-I-4) 1 11 10 8 3 7 2 9 5 4 6 ( 47 )  
 1(D-D-4) 1 11 10 8 4 6 2 9 5 3 7 ( 50 )  
 44 1.95821 1 11 10 8 2 9 5 4 6 3 7[+-----+]1000101111 0(S-D-4)  
 1(D-I-4) 1 11 10 9 5 4 6 3 7 2 8 ( 53 )  
 45 1.95999 1 11 10 7 3 8 4 5 2 9 6[+-----+]1000101110 0(D-I-4) 1 11 9 7 2 10 8 4 5 3 6 ( 39 )  
 1(D-D-4) 1 11 10 9 6 2 8 4 5 3 7 ( 58 )  
 46 1.96152 1 11 10 7 3 8 4 6 2 9 5[+-----+]1000101010 0(D-D-4) 1 11 9 6 2 10 7 3 8 4 5 ( 40 )  
 1(D-I-4) 1 11 10 9 5 3 7 2 8 4 6 ( 57 )  
 47 1.96321 1 11 10 8 3 7 2 9 5 4 6[+-----+]1000101011 0(D-I-4) 1 11 10 7 2 9 5 3 8 4 6 ( 43 )  
 1(D-D-4) 1 11 10 9 5 4 6 2 8 3 7 ( 54 )  
 48 1.96486 1 11 9 7 3 6 2 10 8 4 5[+-----+]1000101001 0(S-D-4)  
 1(D-I-4) 1 11 10 8 4 5 2 9 7 3 6 ( 49 )  
 49 1.96865 1 11 10 8 4 5 2 9 7 3 6[+-----+]1000111001 0(D-I-4) 1 11 9 7 3 6 2 10 8 4 5 ( 48 )  
 1(S-D-4)  
 50 1.97014 1 11 10 8 4 6 2 9 5 3 7[+-----+]1000111011 0(D-D-4) 1 11 10 7 2 9 5 3 8 4 6 ( 43 )  
 1(D-I-4) 1 11 10 9 5 4 6 2 8 3 7 ( 54 )  
 51 1.97157 1 11 10 8 4 5 3 7 2 9 6[+-----+]1000111010 0(D-I-4) 1 11 9 6 2 10 7 3 8 4 5 ( 40 )  
 1(D-D-4) 1 11 10 9 5 3 7 2 8 4 6 ( 57 )  
 52 1.97283 1 11 10 8 4 5 3 6 2 9 7[+-----+]1000111110 0(D-D-4) 1 11 9 7 2 10 8 4 5 3 6 ( 39 )  
 1(D-I-4) 1 11 10 9 6 2 8 4 5 3 7 ( 58 )  
 53 1.97415 1 11 10 9 5 4 6 3 7 2 8[+-----+]1000111111 0(D-I-4) 1 11 10 8 2 9 5 4 6 3 7 ( 44 )  
 1(S-D-4)

54 1.97541 1 11 10 9 5 4 6 2 8 3 7[++++-----]1000111101 0(D-D-4) 1 11 10 8 3 7 2 9 5 4 6 ( 47 )  
 1(D-I-4) 1 11 10 8 4 6 2 9 5 3 7 ( 50 )  
 55 1.97672 1 11 9 7 4 3 5 2 10 8 6[++++-----]1000111100 0(S-I-3)  
 1(D-D-3) 1 11 10 8 5 2 9 7 4 3 6 ( 61 )  
 56 1.97764 1 11 9 7 4 3 6 2 10 8 5[++++-----]1000110100 0(D-D-3) 1 11 9 6 3 7 4 2 10 8 5 ( 42 )  
 1(D-I-3) 1 11 10 7 4 2 9 6 3 8 5 ( 60 )  
 57 1.97889 1 11 10 9 5 3 7 2 8 4 6[++++-----]1000110101 0(D-I-4) 1 11 10 7 3 8 4 6 2 9 5 ( 46 )  
 1(D-D-4) 1 11 10 8 4 5 3 7 2 9 6 ( 51 )  
 58 1.98002 1 11 10 9 6 2 8 4 5 3 7[++++-----]1000110111 0(D-D-4) 1 11 10 7 3 8 4 5 2 9 6 ( 45 )  
 1(D-I-4) 1 11 10 8 4 5 3 6 2 9 7 ( 52 )  
 59 1.98114 1 11 10 7 4 3 8 5 2 9 6[++++-----]1000110110 0(D-I-3) 1 11 9 6 2 10 7 4 3 8 5 ( 38 )  
 1(S-D-3)  
 60 1.98217 1 11 10 7 4 2 9 6 3 8 5[++++-----]1000110010 0(D-D-3) 1 11 9 6 3 8 5 2 10 7 4 ( 41 )  
 1(D-I-3) 1 11 9 7 4 3 6 2 10 8 5 ( 56 )  
 61 1.98326 1 11 10 8 5 2 9 7 4 3 6[++++-----]1000110011 0(D-I-3) 1 11 9 6 3 7 4 2 10 8 5 ( 42 )  
 1(D-D-3) 1 11 9 7 4 3 5 2 10 8 6 ( 55 )  
 62 1.9844 1 11 9 7 4 2 10 8 6 3 5[++++-----]1000110001 0(S-D-3) 1(S-I-3)  
 63 1.98647 1 11 9 7 5 2 10 8 6 3 4[++++-----]1000010001 0(D-I-3) 1 11 10 8 6 3 5 2 9 7 4 ( 69 )  
 1(D-D-3) 1 11 10 8 6 3 4 2 9 7 5 ( 70 )  
 64 1.98748 1 11 10 8 6 2 9 7 4 3 5[++++-----]1000010011 0(D-D-3) 1 11 10 9 6 3 7 4 2 8 5 ( 66 )  
 1(D-I-3) 1 11 10 9 7 4 3 5 2 8 6 ( 73 )  
 65 1.98838 1 11 10 8 5 2 9 6 3 7 4[++++-----]1000010010 0(S-I-3)  
 1(D-D-3) 1 11 10 9 7 4 3 6 2 8 5 ( 74 )  
 66 1.9892 1 11 10 9 6 3 7 4 2 8 5[++++-----]1000010110 0(D-D-3) 1 11 10 8 6 2 9 7 4 3 5 ( 64 )  
 1(D-I-3) 1 11 10 9 8 5 2 7 4 3 6 ( 75 )  
 67 1.98999 1 11 10 9 7 2 8 4 5 3 6[++++-----]1000010111 0(S-I-4)  
 1(D-D-4) 1 11 10 9 8 4 5 3 6 2 7 ( 72 )  
 68 1.99075 1 11 10 9 7 3 6 2 8 4 5[++++-----]1000010101 0(S-D-4)  
 1(D-I-4) 1 11 10 9 8 4 5 2 7 3 6 ( 71 )  
 69 1.99149 1 11 10 8 6 3 5 2 9 7 4[++++-----]1000010100 0(D-I-3) 1 11 9 7 5 2 10 8 6 3 4 ( 63 )  
 1(D-D-3) 1 11 10 9 7 4 2 8 6 3 5 ( 76 )  
 70 1.99213 1 11 10 8 6 3 4 2 9 7 5[++++-----]1000011100 0(D-D-3) 1 11 9 7 5 2 10 8 6 3 4 ( 63 )  
 1(D-I-3) 1 11 10 9 7 4 2 8 6 3 5 ( 76 )  
 71 1.99281 1 11 10 9 8 4 5 2 7 3 6[++++-----]1000011101 0(D-I-4) 1 11 10 9 7 3 6 2 8 4 5 ( 68 )  
 1(S-D-4)  
 72 1.99344 1 11 10 9 8 4 5 3 6 2 7[++++-----]1000011111 0(D-D-4) 1 11 10 9 7 2 8 4 5 3 6 ( 67 )  
 1(S-I-4)  
 73 1.99405 1 11 10 9 7 4 3 5 2 8 6[++++-----]1000011110 0(D-I-3) 1 11 10 8 6 2 9 7 4 3 5 ( 64 )  
 1(D-D-3) 1 11 10 9 8 5 2 7 4 3 6 ( 75 )  
 74 1.99461 1 11 10 9 7 4 3 6 2 8 5[++++-----]1000011010 0(D-D-3) 1 11 10 8 5 2 9 6 3 7 4 ( 65 )  
 1(S-I-3)  
 75 1.99516 1 11 10 9 8 5 2 7 4 3 6[++++-----]1000011011 0(D-I-3) 1 11 10 9 6 3 7 4 2 8 5 ( 66 )  
 1(D-D-3) 1 11 10 9 7 4 3 5 2 8 6 ( 73 )  
 76 1.99567 1 11 10 9 7 4 2 8 6 3 5[++++-----]1000011001 0(D-D-3) 1 11 10 8 6 3 5 2 9 7 4 ( 69 )  
 1(D-I-3) 1 11 10 8 6 3 4 2 9 7 5 ( 70 )  
 77 1.99618 1 11 9 7 5 3 2 10 8 6 4[++++-----]1000011000 0(S-I-2) 1(S-D-2)  
 78 1.99657 1 11 10 8 6 4 2 9 7 5 3[++++-----]1000001000 0(S-D-2)  
 1(D-I-2) 1 11 10 9 7 5 3 2 8 6 4 ( 85 )  
 79 1.99702 1 11 10 9 7 5 2 8 6 3 4[++++-----]1000001001 0(D-I-3) 1 11 10 9 8 6 3 5 2 7 4 ( 81 )  
 1(D-D-3) 1 11 10 9 8 6 3 4 2 7 5 ( 82 )  
 80 1.99742 1 11 10 9 8 6 2 7 4 3 5[++++-----]1000001011 0(S-D-3)  
 1(D-I-3) 1 11 10 9 8 7 4 3 5 2 6 ( 83 )  
 81 1.99779 1 11 10 9 8 6 3 5 2 7 4[++++-----]1000001010 0(D-I-3) 1 11 10 9 7 5 2 8 6 3 4 ( 79 )  
 1(D-D-3) 1 11 10 9 8 7 4 2 6 3 5 ( 84 )

|    |         |   |          |                                |
|----|---------|---|----------|--------------------------------|
| 82 | 1.99813 | 1 11 10 9 8 6 3 4 2 7 5[+++++---]1000001110 | 0(D-D-3) | 1 11 10 9 7 5 2 8 6 3 4 ( 79 ) |
|    |         |   | 1(D-I-3) | 1 11 10 9 8 7 4 2 6 3 5 ( 84 ) |
| 83 | 1.99844 | 1 11 10 9 8 7 4 3 5 2 6[+++++---]1000001111 | 0(D-I-3) | 1 11 10 9 8 6 2 7 4 3 5 ( 80 ) |
|    |         |   | 1(S-D-3) |                                |
| 84 | 1.99872 | 1 11 10 9 8 7 4 2 6 3 5[+++++---]1000001101 | 0(D-D-3) | 1 11 10 9 8 6 3 5 2 7 4 ( 81 ) |
|    |         |   | 1(D-I-3) | 1 11 10 9 8 6 3 4 2 7 5 ( 82 ) |
| 85 | 1.99898 | 1 11 10 9 7 5 3 2 8 6 4[+++++---]1000001100 | 0(D-I-2) | 1 11 10 8 6 4 2 9 7 5 3 ( 78 ) |
|    |         |   | 1(S-D-2) |                                |
| 86 | 1.9992  | 1 11 10 9 8 6 4 2 7 5 3[+++++---]1000000100 | 0(S-D-2) |                                |
|    |         |   | 1(D-I-2) | 1 11 10 9 8 7 5 3 2 6 4 ( 89 ) |
| 87 | 1.9994  | 1 11 10 9 8 7 5 2 6 3 4[+++++---]1000000101 | 0(S-I-3) |                                |
|    |         |   | 1(D-D-3) | 1 11 10 9 8 7 6 3 4 2 5 ( 88 ) |
| 88 | 1.99957 | 1 11 10 9 8 7 6 3 4 2 5[+++++---]1000000111 | 0(D-D-3) | 1 11 10 9 8 7 5 2 6 3 4 ( 87 ) |
|    |         |   | 1(S-I-3) |                                |
| 89 | 1.99971 | 1 11 10 9 8 7 5 3 2 6 4[+++++---]1000000110 | 0(D-I-2) | 1 11 10 9 8 6 4 2 7 5 3 ( 86 ) |
|    |         |   | 1(S-D-2) |                                |
| 90 | 1.99983 | 1 11 10 9 8 7 6 4 2 5 3[+++++---]1000000010 | 0(S-D-2) |                                |
|    |         |   | 1(D-I-2) | 1 11 10 9 8 7 6 5 3 2 4 ( 91 ) |
| 91 | 1.99991 | 1 11 10 9 8 7 6 5 3 2 4[+++++---]1000000011 | 0(D-I-2) | 1 11 10 9 8 7 6 4 2 5 3 ( 90 ) |
|    |         |   | 1(S-D-2) |                                |
| 92 | 1.99997 | 1 11 10 9 8 7 6 5 4 2 3[+++++---]1000000001 | 0(S-D-2) | 1(S-I-2)                       |
| 93 | 2       | 1 11 10 9 8 7 6 5 4 3 2[+++++---]1000000000 | 0(S-I-1) | 1(S-D-1)                       |

----- Order of rotation sequence = 12 , Number of rotation sequences = 170 -----

|    |         |   |          |                                   |
|----|---------|---|----------|-----------------------------------|
| 1  | 1.41698 | 1 12 6 7 3 10 4 9 2 11 5 8[+---+---]10111010101 | 0(S-I-6) | 1(S-D-6)                          |
| 2  | 1.48093 | 1 12 6 7 4 9 2 11 5 8 3 10[+---+---]10111110111 | 0(D-I-6) | 1 12 6 7 5 8 3 10 2 11 4 9 ( 3 )  |
|    |         |   | 1(S-D-6) |                                   |
| 3  | 1.51245 | 1 12 6 7 5 8 3 10 2 11 4 9[+---+---]10111110101 | 0(S-D-6) |                                   |
|    |         |   | 1(D-I-6) | 1 12 6 7 4 9 2 11 5 8 3 10 ( 2 )  |
| 4  | 1.53006 | 1 12 6 7 5 8 4 9 2 11 3 10[+---+---]10111111101 | 0(S-I-6) | 1(S-D-6)                          |
| 5  | 1.54109 | 1 12 6 7 5 8 4 9 3 10 2 11[+---+---]10111111111 | 0(S-D-6) | 1(S-I-6)                          |
| 6  | 1.61297 | 1 12 7 4 9 2 11 6 5 8 3 10[+---+---]10111101111 | 0(S-I-5) | 1(S-D-5)                          |
| 7  | 1.64128 | 1 12 8 3 10 2 11 6 5 7 4 9[+---+---]10110101111 | 0(S-D-5) |                                   |
|    |         |   | 1(D-I-5) | 1 12 9 2 11 6 5 7 4 8 3 10 ( 10 ) |
| 8  | 1.66964 | 1 12 7 3 10 4 9 2 11 6 5 8[+---+---]10110101011 | 0(S-I-5) |                                   |
|    |         |   | 1(D-D-5) | 1 12 8 2 11 6 5 7 3 10 4 9 ( 11 ) |
| 9  | 1.67877 | 1 12 7 3 10 5 8 2 11 6 4 9[+---+---]10110110101 | 0(S-D-5) |                                   |
|    |         |   | 1(D-I-5) | 1 12 8 2 11 6 5 7 3 10 4 9 ( 11 ) |
| 10 | 1.69885 | 1 12 9 2 11 6 5 7 4 8 3 10[+---+---]10110111111 | 0(D-I-5) | 1 12 8 3 10 2 11 6 5 7 4 9 ( 7 )  |
|    |         |   | 1(S-D-5) |                                   |
| 11 | 1.70484 | 1 12 8 2 11 6 5 7 3 10 4 9[+---+---]10110111101 | 0(D-D-5) | 1 12 7 3 10 4 9 2 11 6 5 8 ( 8 )  |
|    |         |   | 1(D-I-5) | 1 12 7 3 10 5 8 2 11 6 4 9 ( 9 )  |
| 12 | 1.71797 | 1 12 7 2 11 6 4 9 3 10 5 8[+---+---]10110110101 | 0(S-I-5) |                                   |
|    |         |   | 1(D-D-5) | 1 12 8 2 11 7 3 10 5 6 4 9 ( 13 ) |
| 13 | 1.72598 | 1 12 8 2 11 7 3 10 5 6 4 9[+---+---]10110110111 | 0(D-D-5) | 1 12 7 2 11 6 4 9 3 10 5 8 ( 12 ) |
|    |         |   | 1(S-I-5) |                                   |
| 14 | 1.77827 | 1 12 8 4 9 5 2 11 7 3 10 6[+---+---]10010110010 | 0(D-I-4) | 1 12 9 5 4 7 2 11 8 3 10 6 ( 47 ) |
|    |         |   | 1(D-D-4) | 1 12 10 6 3 8 2 11 9 5 4 7 ( 46 ) |
| 15 | 1.78918 | 1 12 8 4 9 5 3 10 6 2 11 7[+---+---]10010110110 | 0(D-D-4) | 1 12 10 6 3 9 5 4 8 2 11 7 ( 54 ) |
|    |         |   | 1(D-I-4) | 1 12 11 7 2 10 6 3 9 5 4 8 ( 55 ) |
| 16 | 1.79975 | 1 12 9 2 11 7 3 10 5 6 4 8[+---+---]10010110111 | 0(D-I-5) | 1 12 9 3 10 5 7 2 11 6 4 8 ( 22 ) |
|    |         |   | 1(D-D-5) | 1 12 10 5 6 4 8 2 11 7 3 9 ( 37 ) |
| 17 | 1.80495 | 1 12 8 2 11 6 4 9 3 10 5 7[+---+---]10010110101 | 0(D-D-5) | 1 12 9 3 10 4 8 2 11 6 5 7 ( 23 ) |
|    |         |   | 1(D-I-5) | 1 12 10 5 7 3 9 2 11 6 4 8 ( 34 ) |

18 1.81448 1 12 9 2 11 6 5 7 3 10 4 8[+-+-----]10010111101 0(D-I-5) 1 12 10 3 9 2 11 6 5 7 4 8 ( 26 )  
 1(D-D-5) 1 12 10 4 8 2 11 6 5 7 3 9 ( 31 )  
 19 1.81797 1 12 10 2 11 6 5 7 4 8 3 9[+-+-----]10010111111 0(S-D-5)  
 1(D-I-5) 1 12 11 6 5 7 4 8 3 9 2 10 ( 40 )  
 20 1.82192 1 12 9 3 10 5 6 4 7 2 11 8[+-+-----]10010111110 0(D-I-5) 1 12 10 5 6 4 7 3 9 2 11 8 ( 38 )  
 1(D-D-5) 1 12 11 8 2 10 5 6 4 7 3 9 ( 52 )  
 21 1.82361 1 12 9 3 10 5 6 4 8 2 11 7[+-+-----]10010111010 0(S-D-5)  
 1(D-I-5) 1 12 11 7 3 9 2 10 5 6 4 8 ( 49 )  
 22 1.82759 1 12 9 3 10 5 7 2 11 6 4 8[+-+-----]10010111011 0(D-I-5) 1 12 9 2 11 7 3 10 5 6 4 8 ( 16 )  
 1(D-D-5) 1 12 11 6 4 8 2 10 5 7 3 9 ( 43 )  
 23 1.83697 1 12 9 3 10 4 8 2 11 6 5 7[+-+-----]10010101011 0(D-D-5) 1 12 8 2 11 6 4 9 3 10 5 7 ( 17 )  
 1(D-I-5) 1 12 11 6 5 7 3 9 2 10 4 8 ( 42 )  
 24 1.84047 1 12 9 4 8 3 10 5 7 2 11 6[+-+-----]10010101010 0(S-I-5)  
 1(D-D-5) 1 12 11 6 3 9 4 8 2 10 5 7 ( 50 )  
 25 1.84211 1 12 9 4 8 3 10 5 6 2 11 7[+-+-----]10010101110 0(D-D-5) 1 12 10 5 6 3 9 4 8 2 11 7 ( 33 )  
 1(D-I-5) 1 12 11 7 2 10 5 6 3 9 4 8 ( 51 )  
 26 1.84528 1 12 10 3 9 2 11 6 5 7 4 8[+-+-----]10010101111 0(D-I-5) 1 12 9 2 11 6 5 7 3 10 4 8 ( 18 )  
 1(D-D-5) 1 12 11 6 5 7 4 8 2 10 3 9 ( 41 )  
 27 1.84804 1 12 9 4 8 2 11 6 3 10 5 7[+-+-----]10010101101 0(S-D-5)  
 1(D-I-5) 1 12 10 5 7 2 11 6 3 9 4 8 ( 30 )  
 28 1.85644 1 12 9 4 7 2 11 8 3 10 5 6[+-+-----]10010100101 0(S-I-5)  
 1(D-D-5) 1 12 10 5 6 3 8 2 11 9 4 7 ( 35 )  
 29 1.86572 1 12 10 5 6 2 11 8 3 9 4 7[+-+-----]10011100101 0(S-D-5)  
 1(D-I-5) 1 12 10 5 6 3 8 2 11 9 4 7 ( 35 )  
 30 1.87318 1 12 10 5 7 2 11 6 3 9 4 8[+-+-----]10011101101 0(D-I-5) 1 12 9 4 8 2 11 6 3 10 5 7 ( 27 )  
 1(S-D-5)  
 31 1.87537 1 12 10 4 8 2 11 6 5 7 3 9[+-+-----]10011101111 0(D-D-5) 1 12 9 2 11 6 5 7 3 10 4 8 ( 18 )  
 1(D-I-5) 1 12 11 6 5 7 4 8 2 10 3 9 ( 41 )  
 32 1.87768 1 12 10 5 6 3 9 4 7 2 11 8[+-+-----]10011101110 0(S-I-5)  
 1(D-D-5) 1 12 11 7 2 10 5 6 3 9 4 8 ( 51 )  
 33 1.87909 1 12 10 5 6 3 9 4 8 2 11 7[+-+-----]10011101010 0(D-D-5) 1 12 9 4 8 3 10 5 6 2 11 7 ( 25 )  
 1(D-I-5) 1 12 11 6 3 9 4 8 2 10 5 7 ( 50 )  
 34 1.88134 1 12 10 5 7 3 9 2 11 6 4 8[+-+-----]10011101011 0(D-I-5) 1 12 8 2 11 6 4 9 3 10 5 7 ( 17 )  
 1(D-D-5) 1 12 11 6 5 7 3 9 2 10 4 8 ( 42 )  
 35 1.8838 1 12 10 5 6 3 8 2 11 9 4 7[+-+-----]10011101001 0(D-D-5) 1 12 9 4 7 2 11 8 3 10 5 6 ( 28 )  
 1(D-I-5) 1 12 10 5 6 2 11 8 3 9 4 7 ( 29 )  
 36 1.88584 1 12 10 5 6 4 7 2 11 9 3 8[+-+-----]10011111001 0(S-I-5) 1(S-D-5)  
 37 1.88817 1 12 10 5 6 4 8 2 11 7 3 9[+-+-----]10011111011 0(D-D-5) 1 12 9 2 11 7 3 10 5 6 4 8 ( 16 )  
 1(D-I-5) 1 12 11 6 4 8 2 10 5 7 3 9 ( 43 )  
 38 1.89015 1 12 10 5 6 4 7 3 9 2 11 8[+-+-----]10011111010 0(D-I-5) 1 12 9 3 10 5 6 4 7 2 11 8 ( 20 )  
 1(D-D-5) 1 12 11 7 3 9 2 10 5 6 4 8 ( 49 )  
 39 1.8914 1 12 10 5 6 4 7 3 8 2 11 9[+-+-----]10011111110 0(S-D-5)  
 1(D-I-5) 1 12 11 8 2 10 5 6 4 7 3 9 ( 52 )  
 40 1.89321 1 12 11 6 5 7 4 8 3 9 2 10[+-+-----]10011111111 0(D-I-5) 1 12 10 2 11 6 5 7 4 8 3 9 ( 19 )  
 1(S-D-5)  
 41 1.89481 1 12 11 6 5 7 4 8 2 10 3 9[+-+-----]10011111101 0(D-D-5) 1 12 10 3 9 2 11 6 5 7 4 8 ( 26 )  
 1(D-I-5) 1 12 10 4 8 2 11 6 5 7 3 9 ( 31 )  
 42 1.89903 1 12 11 6 5 7 3 9 2 10 4 8[+-+-----]10011110101 0(D-I-5) 1 12 9 3 10 4 8 2 11 6 5 7 ( 23 )  
 1(D-D-5) 1 12 10 5 7 3 9 2 11 6 4 8 ( 34 )  
 43 1.90063 1 12 11 6 4 8 2 10 5 7 3 9[+-+-----]10011110111 0(D-D-5) 1 12 9 3 10 5 7 2 11 6 4 8 ( 22 )  
 1(D-I-5) 1 12 10 5 6 4 8 2 11 7 3 9 ( 37 )  
 44 1.90244 1 12 9 5 4 6 3 10 7 2 11 8[+-+-----]10011110110 0(D-I-4) 1 12 10 6 3 9 5 4 7 2 11 8 ( 53 )  
 1(D-D-4) 1 12 11 7 2 10 6 3 9 5 4 8 ( 55 )  
 45 1.90384 1 12 9 5 4 6 2 11 8 3 10 7[+-+-----]10011110010 0(S-D-4)  
 1(D-I-4) 1 12 10 6 3 8 2 11 9 5 4 7 ( 46 )

|    |         |                          |             |             |          |                                    |
|----|---------|--------------------------|-------------|-------------|----------|------------------------------------|
| 46 | 1.9074  | 1 12 10 6 3 8 2 11 9 5 4 | 7[+--+---+] | 10011010011 | 0(D-D-4) | 1 12 8 4 9 5 2 11 7 3 10 6 ( 14 )  |
|    |         |                          |             |             | 1(D-I-4) | 1 12 9 5 4 6 2 11 8 3 10 7 ( 45 )  |
| 47 | 1.91074 | 1 12 9 5 4 7 2 11 8 3 10 | 6[+--+---+] | 10011010010 | 0(D-I-4) | 1 12 8 4 9 5 2 11 7 3 10 6 ( 14 )  |
|    |         |                          |             |             | 1(S-D-4) |                                    |
| 48 | 1.9121  | 1 12 9 5 4 8 3 10 6 2 11 | 7[+--+---+] | 10011010110 | 0(S-D-4) |                                    |
|    |         |                          |             |             | 1(D-I-4) | 1 12 10 6 3 9 5 4 8 2 11 7 ( 54 )  |
| 49 | 1.91376 | 1 12 11 7 3 9 2 10 5 6 4 | 8[+--+---+] | 10011010111 | 0(D-I-5) | 1 12 9 3 10 5 6 4 8 2 11 7 ( 21 )  |
|    |         |                          |             |             | 1(D-D-5) | 1 12 10 5 6 4 7 3 9 2 11 8 ( 38 )  |
| 50 | 1.9152  | 1 12 11 6 3 9 4 8 2 10 5 | 7[+--+---+] | 10011010101 | 0(D-D-5) | 1 12 9 4 8 3 10 5 7 2 11 6 ( 24 )  |
|    |         |                          |             |             | 1(D-I-5) | 1 12 10 5 6 3 9 4 8 2 11 7 ( 33 )  |
| 51 | 1.91896 | 1 12 11 7 2 10 5 6 3 9 4 | 8[+--+---+] | 10011011101 | 0(D-I-5) | 1 12 9 4 8 3 10 5 6 2 11 7 ( 25 )  |
|    |         |                          |             |             | 1(D-D-5) | 1 12 10 5 6 3 9 4 7 2 11 8 ( 32 )  |
| 52 | 1.9203  | 1 12 11 8 2 10 5 6 4 7 3 | 9[+--+---+] | 10011011111 | 0(D-D-5) | 1 12 9 3 10 5 6 4 7 2 11 8 ( 20 )  |
|    |         |                          |             |             | 1(D-I-5) | 1 12 10 5 6 4 7 3 8 2 11 9 ( 39 )  |
| 53 | 1.92173 | 1 12 10 6 3 9 5 4 7 2 11 | 8[+--+---+] | 10011011110 | 0(D-I-4) | 1 12 9 5 4 6 3 10 7 2 11 8 ( 44 )  |
|    |         |                          |             |             | 1(S-D-4) |                                    |
| 54 | 1.92284 | 1 12 10 6 3 9 5 4 8 2 11 | 7[+--+---+] | 10011011010 | 0(D-D-4) | 1 12 8 4 9 5 3 10 6 2 11 7 ( 15 )  |
|    |         |                          |             |             | 1(D-I-4) | 1 12 9 5 4 8 3 10 6 2 11 7 ( 48 )  |
| 55 | 1.92431 | 1 12 11 7 2 10 6 3 9 5 4 | 8[+--+---+] | 10011011011 | 0(D-I-4) | 1 12 8 4 9 5 3 10 6 2 11 7 ( 15 )  |
|    |         |                          |             |             | 1(D-D-4) | 1 12 9 5 4 6 3 10 7 2 11 8 ( 44 )  |
| 56 | 1.92585 | 1 12 9 5 3 10 6 2 11 8 4 | 7[+--+---+] | 10011011001 | 0(S-D-4) | 1(S-I-4)                           |
| 57 | 1.92849 | 1 12 9 5 3 10 7 2 11 8 4 | 6[+--+---+] | 10011001001 | 0(D-I-4) | 1 12 9 5 2 11 8 4 7 3 10 6 ( 59 )  |
|    |         |                          |             |             | 1(D-D-4) | 1 12 9 6 2 11 8 4 5 3 10 7 ( 60 )  |
| 58 | 1.93007 | 1 12 10 6 2 11 8 3 9 5 4 | 7[+--+---+] | 10011001011 | 0(S-D-4) |                                    |
|    |         |                          |             |             | 1(D-I-4) | 1 12 10 7 2 11 9 5 4 6 3 8 ( 61 )  |
| 59 | 1.93162 | 1 12 9 5 2 11 8 4 7 3 10 | 6[+--+---+] | 10011001010 | 0(D-I-4) | 1 12 9 5 3 10 7 2 11 8 4 6 ( 57 )  |
|    |         |                          |             |             | 1(D-D-4) | 1 12 10 6 2 11 9 5 3 8 4 7 ( 62 )  |
| 60 | 1.93288 | 1 12 9 6 2 11 8 4 5 3 10 | 7[+--+---+] | 10011001110 | 0(D-D-4) | 1 12 9 5 3 10 7 2 11 8 4 6 ( 57 )  |
|    |         |                          |             |             | 1(D-I-4) | 1 12 10 6 2 11 9 5 3 8 4 7 ( 62 )  |
| 61 | 1.93455 | 1 12 10 7 2 11 9 5 4 6 3 | 8[+--+---+] | 10011001111 | 0(D-I-4) | 1 12 10 6 2 11 8 3 9 5 4 7 ( 58 )  |
|    |         |                          |             |             | 1(S-D-4) |                                    |
| 62 | 1.93632 | 1 12 10 6 2 11 9 5 3 8 4 | 7[+--+---+] | 10011001101 | 0(D-D-4) | 1 12 9 5 2 11 8 4 7 3 10 6 ( 59 )  |
|    |         |                          |             |             | 1(D-I-4) | 1 12 9 6 2 11 8 4 5 3 10 7 ( 60 )  |
| 63 | 1.94252 | 1 12 9 6 3 10 7 4 2 11 8 | 5[+--+---+] | 10001001100 | 0(D-D-3) | 1 12 10 7 4 3 9 6 2 11 8 5 ( 104 ) |
|    |         |                          |             |             | 1(D-I-3) | 1 12 11 8 5 2 10 7 4 3 9 6 ( 107 ) |
| 64 | 1.94604 | 1 12 10 7 2 11 9 5 3 8 4 | 6[+--+---+] | 10001001101 | 0(D-I-4) | 1 12 11 8 4 7 3 9 5 2 10 6 ( 80 )  |
|    |         |                          |             |             | 1(D-D-4) | 1 12 11 8 4 5 3 9 6 2 10 7 ( 86 )  |
| 65 | 1.94762 | 1 12 10 8 2 11 9 5 4 6 3 | 7[+--+---+] | 10001001111 | 0(D-D-4) | 1 12 11 8 3 9 5 4 6 2 10 7 ( 73 )  |
|    |         |                          |             |             | 1(D-I-4) | 1 12 11 9 5 4 6 3 7 2 10 8 ( 93 )  |
| 66 | 1.94902 | 1 12 10 7 2 11 8 4 5 3 9 | 6[+--+---+] | 10001001110 | 0(S-I-4) |                                    |
|    |         |                          |             |             | 1(D-D-4) | 1 12 11 9 5 3 8 4 6 2 10 7 ( 100 ) |
| 67 | 1.95011 | 1 12 10 6 2 11 8 4 7 3 9 | 5[+--+---+] | 10001001010 | 0(S-D-4) |                                    |
|    |         |                          |             |             | 1(D-I-4) | 1 12 11 9 5 3 8 4 7 2 10 6 ( 99 )  |
| 68 | 1.95133 | 1 12 10 7 2 11 8 3 9 5 4 | 6[+--+---+] | 10001001011 | 0(D-I-4) | 1 12 11 8 3 9 5 4 7 2 10 6 ( 72 )  |
|    |         |                          |             |             | 1(D-D-4) | 1 12 11 9 5 4 6 3 8 2 10 7 ( 94 )  |
| 69 | 1.95249 | 1 12 10 7 3 9 6 2 11 8 4 | 5[+--+---+] | 10001001001 | 0(D-D-4) | 1 12 11 8 4 6 2 10 7 3 9 5 ( 81 )  |
|    |         |                          |             |             | 1(D-I-4) | 1 12 11 8 4 5 2 10 7 3 9 6 ( 85 )  |
| 70 | 1.95489 | 1 12 10 7 3 9 5 2 11 8 4 | 6[+--+---+] | 10001011001 | 0(D-I-4) | 1 12 10 8 3 7 2 11 9 5 4 6 ( 82 )  |
|    |         |                          |             |             | 1(D-D-4) | 1 12 10 8 4 6 2 11 9 5 3 7 ( 84 )  |
| 71 | 1.95592 | 1 12 11 8 2 10 6 3 9 5 4 | 7[+--+---+] | 10001011011 | 0(S-D-4) |                                    |
|    |         |                          |             |             | 1(D-I-4) | 1 12 11 9 5 4 7 2 10 6 3 8 ( 95 )  |
| 72 | 1.95691 | 1 12 11 8 3 9 5 4 7 2 10 | 6[+--+---+] | 10001011010 | 0(D-I-4) | 1 12 10 7 2 11 8 3 9 5 4 6 ( 68 )  |
|    |         |                          |             |             | 1(D-D-4) | 1 12 11 10 6 3 8 2 9 5 4 7 ( 98 )  |
| 73 | 1.95774 | 1 12 11 8 3 9 5 4 6 2 10 | 7[+--+---+] | 10001011110 | 0(D-D-4) | 1 12 10 8 2 11 9 5 4 6 3 7 ( 65 )  |
|    |         |                          |             |             | 1(D-I-4) | 1 12 11 10 7 2 9 5 4 6 3 8 ( 101 ) |

74 1.95866 1 12 11 9 2 10 5 6 4 7 3 8[+++ +-----]10001011111 0(S-I-5)  
 1(D-D-5) 1 12 11 10 5 6 4 7 3 8 2 9 ( 92 )  
 75 1.95953 1 12 11 8 2 10 5 6 3 9 4 7[+++ +-----]10001011101 0(D-D-5) 1 12 11 9 3 8 2 10 5 6 4 7 ( 79 )  
 1(D-I-5) 1 12 11 9 4 7 2 10 5 6 3 8 ( 87 )  
 76 1.96052 1 12 10 7 3 8 4 5 2 11 9 6[+++ +-----]10001011100 0(D-I-4) 1 12 10 8 4 5 3 7 2 11 9 6 ( 89 )  
 1(D-D-4) 1 12 11 9 6 2 10 8 4 5 3 7 ( 106 )  
 77 1.961 1 12 10 7 3 8 4 6 2 11 9 5[+++ +-----]10001010100 0(S-D-4)  
 1(D-I-4) 1 12 11 9 5 2 10 7 3 8 4 6 ( 105 )  
 78 1.96196 1 12 11 8 3 9 4 7 2 10 5 6[+++ +-----]10001010101 0(S-I-5)  
 1(D-D-5) 1 12 11 10 5 6 3 8 2 9 4 7 ( 88 )  
 79 1.96279 1 12 11 9 3 8 2 10 5 6 4 7[+++ +-----]10001010111 0(D-D-5) 1 12 11 8 2 10 5 6 3 9 4 7 ( 75 )  
 1(D-I-5) 1 12 11 10 5 6 4 7 2 9 3 8 ( 91 )  
 80 1.96364 1 12 11 8 4 7 3 9 5 2 10 6[+++ +-----]10001010110 0(D-I-4) 1 12 10 7 2 11 9 5 3 8 4 6 ( 64 )  
 1(D-D-4) 1 12 11 10 6 2 9 5 3 8 4 7 ( 102 )  
 81 1.96441 1 12 11 8 4 6 2 10 7 3 9 5[+++ +-----]10001010010 0(D-D-4) 1 12 10 7 3 9 6 2 11 8 4 5 ( 69 )  
 1(D-I-4) 1 12 11 9 5 3 7 2 10 8 4 6 ( 97 )  
 82 1.96532 1 12 10 8 3 7 2 11 9 5 4 6[+++ +-----]10001010011 0(D-I-4) 1 12 10 7 3 9 5 2 11 8 4 6 ( 70 )  
 1(D-D-4) 1 12 11 9 5 4 6 2 10 8 3 7 ( 96 )  
 83 1.96681 1 12 10 8 4 5 2 11 9 7 3 6[+++ +-----]10001110001 0(S-I-4) 1(S-D-4)  
 84 1.96822 1 12 10 8 4 6 2 11 9 5 3 7[+++ +-----]10001110011 0(D-D-4) 1 12 10 7 3 9 5 2 11 8 4 6 ( 70 )  
 1(D-I-4) 1 12 11 9 5 4 6 2 10 8 3 7 ( 96 )  
 85 1.96906 1 12 11 8 4 5 2 10 7 3 9 6[+++ +-----]10001110010 0(D-I-4) 1 12 10 7 3 9 6 2 11 8 4 5 ( 69 )  
 1(D-D-4) 1 12 11 9 5 3 7 2 10 8 4 6 ( 97 )  
 86 1.96977 1 12 11 8 4 5 3 9 6 2 10 7[+++ +-----]10001110110 0(D-D-4) 1 12 10 7 2 11 9 5 3 8 4 6 ( 64 )  
 1(D-I-4) 1 12 11 10 6 2 9 5 3 8 4 7 ( 102 )  
 87 1.97051 1 12 11 9 4 7 2 10 5 6 3 8[+++ +-----]10001110111 0(D-I-5) 1 12 11 8 2 10 5 6 3 9 4 7 ( 75 )  
 1(D-D-5) 1 12 11 10 5 6 4 7 2 9 3 8 ( 91 )  
 88 1.97121 1 12 11 10 5 6 3 8 2 9 4 7[+++ +-----]10001110101 0(D-D-5) 1 12 11 8 3 9 4 7 2 10 5 6 ( 78 )  
 1(S-I-5)  
 89 1.97196 1 12 10 8 4 5 3 7 2 11 9 6[+++ +-----]10001110100 0(D-I-4) 1 12 10 7 3 8 4 5 2 11 9 6 ( 76 )  
 1(D-D-4) 1 12 11 9 5 2 10 7 3 8 4 6 ( 105 )  
 90 1.97244 1 12 10 8 4 5 3 6 2 11 9 7[+++ +-----]10001111100 0(S-D-4)  
 1(D-I-4) 1 12 11 9 6 2 10 8 4 5 3 7 ( 106 )  
 91 1.97317 1 12 11 10 5 6 4 7 2 9 3 8[+++ +-----]10001111101 0(D-I-5) 1 12 11 9 3 8 2 10 5 6 4 7 ( 79 )  
 1(D-D-5) 1 12 11 9 4 7 2 10 5 6 3 8 ( 87 )  
 92 1.97382 1 12 11 10 5 6 4 7 3 8 2 9[+++ +-----]10001111111 0(D-D-5) 1 12 11 9 2 10 5 6 4 7 3 8 ( 74 )  
 1(S-I-5)  
 93 1.97448 1 12 11 9 5 4 6 3 7 2 10 8[+++ +-----]10001111110 0(D-I-4) 1 12 10 8 2 11 9 5 4 6 3 7 ( 65 )  
 1(D-D-4) 1 12 11 10 7 2 9 5 4 6 3 8 ( 101 )  
 94 1.97508 1 12 11 9 5 4 6 3 8 2 10 7[+++ +-----]10001111010 0(D-D-4) 1 12 10 7 2 11 8 3 9 5 4 6 ( 68 )  
 1(D-I-4) 1 12 11 10 6 3 8 2 9 5 4 7 ( 98 )  
 95 1.97573 1 12 11 9 5 4 7 2 10 6 3 8[+++ +-----]10001111011 0(D-I-4) 1 12 11 8 2 10 6 3 9 5 4 7 ( 71 )  
 1(S-D-4)  
 96 1.97636 1 12 11 9 5 4 6 2 10 8 3 7[+++ +-----]10001111001 0(D-D-4) 1 12 10 8 3 7 2 11 9 5 4 6 ( 82 )  
 1(D-I-4) 1 12 10 8 4 6 2 11 9 5 3 7 ( 84 )  
 97 1.97799 1 12 11 9 5 3 7 2 10 8 4 6[+++ +-----]10001101001 0(D-I-4) 1 12 11 8 4 6 2 10 7 3 9 5 ( 81 )  
 1(D-D-4) 1 12 11 8 4 5 2 10 7 3 9 6 ( 85 )  
 98 1.97859 1 12 11 10 6 3 8 2 9 5 4 7[+++ +-----]10001101011 0(D-D-4) 1 12 11 8 3 9 5 4 7 2 10 6 ( 72 )  
 1(D-I-4) 1 12 11 9 5 4 6 3 8 2 10 7 ( 94 )  
 99 1.97918 1 12 11 9 5 3 8 4 7 2 10 6[+++ +-----]10001101010 0(D-I-4) 1 12 10 6 2 11 8 4 7 3 9 5 ( 67 )  
 1(S-D-4)  
 100 1.97973 1 12 11 9 5 3 8 4 6 2 10 7[+++ +-----]10001101110 0(D-D-4) 1 12 10 7 2 11 8 4 5 3 9 6 ( 66 )  
 1(S-I-4)  
 101 1.9803 1 12 11 10 7 2 9 5 4 6 3 8[+++ +-----]10001101111 0(D-I-4) 1 12 11 8 3 9 5 4 6 2 10 7 ( 73 )  
 1(D-D-4) 1 12 11 9 5 4 6 3 7 2 10 8 ( 93 )

102 1.98085 1 12 11 10 6 2 9 5 3 8 4 7[+++---+---]10001101101 0(D-D-4) 1 12 11 8 4 7 3 9 5 2 10 6 ( 80 )  
 1(D-I-4) 1 12 11 8 4 5 3 9 6 2 10 7 ( 86 )  
 103 1.98143 1 12 10 7 4 3 8 5 2 11 9 6[+++---+---]10001101100 0(S-I-3)  
 1(D-D-3) 1 12 11 8 5 2 10 7 4 3 9 6 ( 107 )  
 104 1.98188 1 12 10 7 4 3 9 6 2 11 8 5[+++---+---]10001100100 0(D-D-3) 1 12 9 6 3 10 7 4 2 11 8 5 ( 63 )  
 1(S-I-3)  
 105 1.98245 1 12 11 9 5 2 10 7 3 8 4 6[+++---+---]10001100101 0(D-I-4) 1 12 10 7 3 8 4 6 2 11 9 5 ( 77 )  
 1(D-D-4) 1 12 10 8 4 5 3 7 2 11 9 6 ( 89 )  
 106 1.98299 1 12 11 9 6 2 10 8 4 5 3 7[+++---+---]10001100111 0(D-D-4) 1 12 10 7 3 8 4 5 2 11 9 6 ( 76 )  
 1(D-I-4) 1 12 10 8 4 5 3 6 2 11 9 7 ( 90 )  
 107 1.98354 1 12 11 8 5 2 10 7 4 3 9 6[+++---+---]10001100110 0(D-I-3) 1 12 9 6 3 10 7 4 2 11 8 5 ( 63 )  
 1(D-D-3) 1 12 10 7 4 3 8 5 2 11 9 6 ( 103 )  
 108 1.98409 1 12 10 7 4 2 11 9 6 3 8 5[+++---+---]10001100010 0(S-D-3)  
 1(D-I-3) 1 12 10 8 5 2 11 9 7 4 3 6 ( 109 )  
 109 1.98475 1 12 10 8 5 2 11 9 7 4 3 6[+++---+---]10001100011 0(D-I-3) 1 12 10 7 4 2 11 9 6 3 8 5 ( 108 )  
 1(S-D-3)  
 110 1.98614 1 12 10 8 6 2 11 9 7 4 3 5[+++++---]10000100011 0(D-D-3) 1 12 11 9 6 3 7 4 2 10 8 5 ( 116 )  
 1(D-I-3) 1 12 11 9 7 4 3 5 2 10 8 6 ( 131 )  
 111 1.98675 1 12 10 8 5 2 11 9 6 3 7 4[+++++---]10000100010 0(D-I-3) 1 12 11 9 6 3 8 5 2 10 7 4 ( 115 )  
 1(D-D-3) 1 12 11 9 7 4 3 6 2 10 8 5 ( 132 )  
 112 1.98724 1 12 11 9 6 2 10 7 4 3 8 5[+++++---]10000100110 0(S-D-3)  
 1(D-I-3) 1 12 11 10 7 4 3 8 5 2 9 6 ( 135 )  
 113 1.98772 1 12 11 9 7 2 10 8 4 5 3 6[+++++---]10000100111 0(D-I-4) 1 12 11 10 7 3 8 4 5 2 9 6 ( 119 )  
 1(D-D-4) 1 12 11 10 8 4 5 3 6 2 9 7 ( 128 )  
 114 1.98816 1 12 11 9 6 2 10 7 3 8 4 5[+++++---]10000100101 0(D-D-4) 1 12 11 10 7 3 8 4 6 2 9 5 ( 120 )  
 1(D-I-4) 1 12 11 10 8 4 5 3 7 2 9 6 ( 127 )  
 115 1.98861 1 12 11 9 6 3 8 5 2 10 7 4[+++++---]10000100100 0(D-I-3) 1 12 10 8 5 2 11 9 6 3 7 4 ( 111 )  
 1(D-D-3) 1 12 11 10 7 4 2 9 6 3 8 5 ( 136 )  
 116 1.98898 1 12 11 9 6 3 7 4 2 10 8 5[+++++---]10000101100 0(D-D-3) 1 12 10 8 6 2 11 9 7 4 3 5 ( 110 )  
 1(D-I-3) 1 12 11 10 8 5 2 9 7 4 3 6 ( 137 )  
 117 1.9894 1 12 11 10 7 2 9 5 3 8 4 6[+++++---]10000101101 0(D-I-4) 1 12 11 10 8 3 7 2 9 5 4 6 ( 121 )  
 1(D-D-4) 1 12 11 10 8 4 6 2 9 5 3 7 ( 126 )  
 118 1.9898 1 12 11 10 8 2 9 5 4 6 3 7[+++++---]10000101111 0(S-D-4)  
 1(D-I-4) 1 12 11 10 9 5 4 6 3 7 2 8 ( 129 )  
 119 1.99019 1 12 11 10 7 3 8 4 5 2 9 6[+++++---]10000101110 0(D-I-4) 1 12 11 9 7 2 10 8 4 5 3 6 ( 113 )  
 1(D-D-4) 1 12 11 10 9 6 2 8 4 5 3 7 ( 134 )  
 120 1.99056 1 12 11 10 7 3 8 4 6 2 9 5[+++++---]10000101010 0(D-D-4) 1 12 11 9 6 2 10 7 3 8 4 5 ( 114 )  
 1(D-I-4) 1 12 11 10 9 5 3 7 2 8 4 6 ( 133 )  
 121 1.99094 1 12 11 10 8 3 7 2 9 5 4 6[+++++---]10000101011 0(D-I-4) 1 12 11 10 7 2 9 5 3 8 4 6 ( 117 )  
 1(D-D-4) 1 12 11 10 9 5 4 6 2 8 3 7 ( 130 )  
 122 1.9913 1 12 11 9 7 3 6 2 10 8 4 5[+++++---]10000101001 0(S-D-4)  
 1(D-I-4) 1 12 11 10 8 4 5 2 9 7 3 6 ( 125 )  
 123 1.9917 1 12 10 8 6 3 5 2 11 9 7 4[+++++---]10000101000 0(S-I-3)  
 1(D-D-3) 1 12 11 9 7 4 2 10 8 6 3 5 ( 138 )  
 124 1.99193 1 12 10 8 6 3 4 2 11 9 7 5[+++++---]10000111000 0(S-D-3)  
 1(D-I-3) 1 12 11 9 7 4 2 10 8 6 3 5 ( 138 )  
 125 1.99231 1 12 11 10 8 4 5 2 9 7 3 6[+++++---]10000111001 0(D-I-4) 1 12 11 9 7 3 6 2 10 8 4 5 ( 122 )  
 1(S-D-4)  
 126 1.99265 1 12 11 10 8 4 6 2 9 5 3 7[+++++---]10000111011 0(D-D-4) 1 12 11 10 7 2 9 5 3 8 4 6 ( 117 )  
 1(D-I-4) 1 12 11 10 9 5 4 6 2 8 3 7 ( 130 )  
 127 1.99297 1 12 11 10 8 4 5 3 7 2 9 6[+++++---]10000111010 0(D-I-4) 1 12 11 9 6 2 10 7 3 8 4 5 ( 114 )  
 1(D-D-4) 1 12 11 10 9 5 3 7 2 8 4 6 ( 133 )  
 128 1.99329 1 12 11 10 8 4 5 3 6 2 9 7[+++++---]10000111110 0(D-D-4) 1 12 11 9 7 2 10 8 4 5 3 6 ( 113 )  
 1(D-I-4) 1 12 11 10 9 6 2 8 4 5 3 7 ( 134 )

129 1.9936 1 12 11 10 9 5 4 6 3 7 2 8[++++-----]10000111111 0(D-I-4) 1 12 11 10 8 2 9 5 4 6 3 7 ( 118 )  
 1(S-D-4)  
 130 1.9939 1 12 11 10 9 5 4 6 2 8 3 7[++++-----]10000111101 0(D-D-4) 1 12 11 10 8 3 7 2 9 5 4 6 ( 121 )  
 1(D-I-4) 1 12 11 10 8 4 6 2 9 5 3 7 ( 126 )  
 131 1.9942 1 12 11 9 7 4 3 5 2 10 8 6[++++-----]10000111100 0(D-I-3) 1 12 10 8 6 2 11 9 7 4 3 5 ( 110 )  
 1(D-D-3) 1 12 11 10 8 5 2 9 7 4 3 6 ( 137 )  
 132 1.99447 1 12 11 9 7 4 3 6 2 10 8 5[++++-+--+]10000110100 0(D-D-3) 1 12 10 8 5 2 11 9 6 3 7 4 ( 111 )  
 1(D-I-3) 1 12 11 10 7 4 2 9 6 3 8 5 ( 136 )  
 133 1.99475 1 12 11 10 9 5 3 7 2 8 4 6[++++-+--+]10000110101 0(D-I-4) 1 12 11 10 7 3 8 4 6 2 9 5 ( 120 )  
 1(D-D-4) 1 12 11 10 8 4 5 3 7 2 9 6 ( 127 )  
 134 1.99502 1 12 11 10 9 6 2 8 4 5 3 7[++++-+----]10000110111 0(D-D-4) 1 12 11 10 7 3 8 4 5 2 9 6 ( 119 )  
 1(D-I-4) 1 12 11 10 8 4 5 3 6 2 9 7 ( 128 )  
 135 1.99529 1 12 11 10 7 4 3 8 5 2 9 6[++++-+--+]10000110110 0(D-I-3) 1 12 11 9 6 2 10 7 4 3 8 5 ( 112 )  
 1(S-D-3)  
 136 1.99555 1 12 11 10 7 4 2 9 6 3 8 5[++++-+--+]10000110010 0(D-D-3) 1 12 11 9 6 3 8 5 2 10 7 4 ( 115 )  
 1(D-I-3) 1 12 11 9 7 4 3 6 2 10 8 5 ( 132 )  
 137 1.9958 1 12 11 10 8 5 2 9 7 4 3 6[++++-+--+]10000110011 0(D-I-3) 1 12 11 9 6 3 7 4 2 10 8 5 ( 116 )  
 1(D-D-3) 1 12 11 9 7 4 3 5 2 10 8 6 ( 131 )  
 138 1.99605 1 12 11 9 7 4 2 10 8 6 3 5[++++-+--+]10000110001 0(D-D-3) 1 12 10 8 6 3 5 2 11 9 7 4 ( 123 )  
 1(D-I-3) 1 12 10 8 6 3 4 2 11 9 7 5 ( 124 )  
 139 1.99638 1 12 10 8 6 4 2 11 9 7 5 3[++++-+--+]10000010000 0(S-D-2)  
 1(D-I-2) 1 12 11 9 7 5 3 2 10 8 6 4 ( 154 )  
 140 1.99669 1 12 11 9 7 5 2 10 8 6 3 4[++++-+--+]10000010001 0(D-I-3) 1 12 11 10 8 6 3 5 2 9 7 4 ( 146 )  
 1(D-D-3) 1 12 11 10 8 6 3 4 2 9 7 5 ( 147 )  
 141 1.99691 1 12 11 10 8 6 2 9 7 4 3 5[++++-+--+]10000010011 0(D-D-3) 1 12 11 10 9 6 3 7 4 2 8 5 ( 143 )  
 1(D-I-3) 1 12 11 10 9 7 4 3 5 2 8 6 ( 150 )  
 142 1.99712 1 12 11 10 8 5 2 9 6 3 7 4[++++-+--+]10000010010 0(S-I-3)  
 1(D-D-3) 1 12 11 10 9 7 4 3 6 2 8 5 ( 151 )  
 143 1.99732 1 12 11 10 9 6 3 7 4 2 8 5[++++-+--+]10000010110 0(D-D-3) 1 12 11 10 8 6 2 9 7 4 3 5 ( 141 )  
 1(D-I-3) 1 12 11 10 9 8 5 2 7 4 3 6 ( 152 )  
 144 1.99751 1 12 11 10 9 7 2 8 4 5 3 6[++++-+----]10000010111 0(S-I-4)  
 1(D-D-4) 1 12 11 10 9 8 4 5 3 6 2 7 ( 149 )  
 145 1.9977 1 12 11 10 9 7 3 6 2 8 4 5[++++-+--+]10000010101 0(S-D-4)  
 1(D-I-4) 1 12 11 10 9 8 4 5 2 7 3 6 ( 148 )  
 146 1.99788 1 12 11 10 8 6 3 5 2 9 7 4[++++-+--+]10000010100 0(D-I-3) 1 12 11 9 7 5 2 10 8 6 3 4 ( 140 )  
 1(D-D-3) 1 12 11 10 9 7 4 2 8 6 3 5 ( 153 )  
 147 1.99805 1 12 11 10 8 6 3 4 2 9 7 5[++++-+--+]10000011100 0(D-D-3) 1 12 11 9 7 5 2 10 8 6 3 4 ( 140 )  
 1(D-I-3) 1 12 11 10 9 7 4 2 8 6 3 5 ( 153 )  
 148 1.99821 1 12 11 10 9 8 4 5 2 7 3 6[++++-+--+]10000011101 0(D-I-4) 1 12 11 10 9 7 3 6 2 8 4 5 ( 145 )  
 1(S-D-4)  
 149 1.99837 1 12 11 10 9 8 4 5 3 6 2 7[++++-+----]10000011111 0(D-D-4) 1 12 11 10 9 7 2 8 4 5 3 6 ( 144 )  
 1(S-I-4)  
 150 1.99851 1 12 11 10 9 7 4 3 5 2 8 6[++++-+--+]10000011110 0(D-I-3) 1 12 11 10 8 6 2 9 7 4 3 5 ( 141 )  
 1(D-D-3) 1 12 11 10 9 8 5 2 7 4 3 6 ( 152 )  
 151 1.99866 1 12 11 10 9 7 4 3 6 2 8 5[++++-+--+]10000011010 0(D-D-3) 1 12 11 10 8 5 2 9 6 3 7 4 ( 142 )  
 1(S-I-3)  
 152 1.99879 1 12 11 10 9 8 5 2 7 4 3 6[++++-+--+]10000011011 0(D-I-3) 1 12 11 10 9 6 3 7 4 2 8 5 ( 143 )  
 1(D-D-3) 1 12 11 10 9 7 4 3 5 2 8 6 ( 150 )  
 153 1.99892 1 12 11 10 9 7 4 2 8 6 3 5[++++-+--+]10000011001 0(D-D-3) 1 12 11 10 8 6 3 5 2 9 7 4 ( 146 )  
 1(D-I-3) 1 12 11 10 8 6 3 4 2 9 7 5 ( 147 )  
 154 1.99904 1 12 11 9 7 5 3 2 10 8 6 4[++++-+--+]10000011000 0(D-I-2) 1 12 10 8 6 4 2 11 9 7 5 3 ( 139 )  
 1(S-D-2)  
 155 1.99915 1 12 11 10 8 6 4 2 9 7 5 3[++++-+--+]10000001000 0(S-D-2)  
 1(D-I-2) 1 12 11 10 9 7 5 3 2 8 6 4 ( 162 )

156 1.99926 1 12 11 10 9 7 5 2 8 6 3 4[+++++---]10000001001 0(D-I-3) 1 12 11 10 9 8 6 3 5 2 7 4 ( 158 )  
 1(D-D-3) 1 12 11 10 9 8 6 3 4 2 7 5 ( 159 )  
 157 1.99936 1 12 11 10 9 8 6 2 7 4 3 5[+++++---]10000001011 0(S-D-3)  
 1(D-I-3) 1 12 11 10 9 8 7 4 3 5 2 6 ( 160 )  
 158 1.99945 1 12 11 10 9 8 6 3 5 2 7 4[+++++---]10000001010 0(D-I-3) 1 12 11 10 9 7 5 2 8 6 3 4 ( 156 )  
 1(D-D-3) 1 12 11 10 9 8 7 4 2 6 3 5 ( 161 )  
 159 1.99953 1 12 11 10 9 8 6 3 4 2 7 5[+++++---]10000001110 0(D-D-3) 1 12 11 10 9 7 5 2 8 6 3 4 ( 156 )  
 1(D-I-3) 1 12 11 10 9 8 7 4 2 6 3 5 ( 161 )  
 160 1.99961 1 12 11 10 9 8 7 4 3 5 2 6[+++++---]10000001111 0(D-I-3) 1 12 11 10 9 8 6 2 7 4 3 5 ( 157 )  
 1(S-D-3)  
 161 1.99968 1 12 11 10 9 8 7 4 2 6 3 5[+++++---]10000001101 0(D-D-3) 1 12 11 10 9 8 6 3 5 2 7 4 ( 158 )  
 1(D-I-3) 1 12 11 10 9 8 6 3 4 2 7 5 ( 159 )  
 162 1.99975 1 12 11 10 9 7 5 3 2 8 6 4[+++++---]10000001100 0(D-I-2) 1 12 11 10 8 6 4 2 9 7 5 3 ( 155 )  
 1(S-D-2)  
 163 1.9998 1 12 11 10 9 8 6 4 2 7 5 3[+++++---]10000000100 0(S-D-2)  
 1(D-I-2) 1 12 11 10 9 8 7 5 3 2 6 4 ( 166 )  
 164 1.99985 1 12 11 10 9 8 7 5 2 6 3 4[+++++---]10000000101 0(S-I-3)  
 1(D-D-3) 1 12 11 10 9 8 7 6 3 4 2 5 ( 165 )  
 165 1.99989 1 12 11 10 9 8 7 6 3 4 2 5[+++++---]10000000111 0(D-D-3) 1 12 11 10 9 8 7 5 2 6 3 4 ( 164 )  
 1(S-I-3)  
 166 1.99993 1 12 11 10 9 8 7 5 3 2 6 4[+++++---]10000000110 0(D-I-2) 1 12 11 10 9 8 6 4 2 7 5 3 ( 163 )  
 1(S-D-2)  
 167 1.99996 1 12 11 10 9 8 7 6 4 2 5 3[+++++---]10000000010 0(S-D-2)  
 1(D-I-2) 1 12 11 10 9 8 7 6 5 3 2 4 ( 168 )  
 168 1.99998 1 12 11 10 9 8 7 6 5 3 2 4[+++++---]10000000011 0(D-I-2) 1 12 11 10 9 8 7 6 4 2 5 3 ( 167 )  
 1(S-D-2)  
 169 1.99999 1 12 11 10 9 8 7 6 5 4 2 3[+++++---]10000000001 0(S-D-2) 1(S-I-2)  
 170 2 1 12 11 10 9 8 7 6 5 4 3 2[+++++---]10000000000 0(S-I-1) 1(S-D-1)