Hide Information Using Table with Floating-Point Numbers

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Abstract

We present in this paper the development and implementation of a new steganographic method, the information will be hidden in the selected parts of the table with floating-point numbers used as stego cover. The method is implemented by transform each character in the text into numbers, then stores it as part of the floating-point number. The main goal of steganography was fulfilled since the resulted table did not drown any suspicion, the same table can be used by experimental person for the different calculation.

المستخلص

يهدف بحثنا هذا الى بناء نظام لاخفاء المعلومات في أماكن مختلفة لجدول الارقام الكسرية التي سوف يتم استخدامها كغطاء للاخفاء.تم الاخفاء بالاعتماد على تحويل النص التي يتكون منها النص المراد اخفائه الى قيم الرقمية للاحرف وخزنها كجزء من الارقام الكسرية. تم طبيقه على حالات دراسية مختلفة وقد تم تنفيذ هدف الاخفاء بنجاح حيث بالامكان استخدام الجداول للحسابات بدون اي اخطاء في جانب التنفيذ . أذا لايوجد اثر يذكر للقيم المضافة على الحسابات.

Introduction

Steganography is the art and the science of passing information or hiding messages in a way that prevents the casual observer or the determined attacker from knowing that the hidden massage exists [5].

A general steganography system is shown in figure (1), in this system there are a number of knowing terminology which are illustrated as follows [1]:-

- **Embedded <Data type>.** Something to be hidden in some thing else.
- **Cover <Data type>.** An input with an "original" form of the stego message. In some application, such cover message is given from the outside, in others, it can be chosen during the hiding process.
- **Stego key or simply key.** Additional secret data that may be needed in the hiding process. In particular, the same key is usually needed to extract the embedded message again.
- **Stego <Data type>.** The output of hiding process. Something that has the embedded message hidden in it.
- **Embedded process.** The process of hidden the embedded message is called embedded process.
- **Extracting process.** Getting the embedded message out of the stego message again is called extracting process.

Stegoanalysis, or attacks on stenographic "carriers" can also be broadly split into two categories: discovery of the message, or destruction of the message may be the most desirable outcome, it is also the most difficult [3].

Stenography has its place in security, it is not intended to replace cryptography but supplement it. Hiding the message with steganography methods reduces the chance of the message being detected. If the message is also encrypted then it is provide another layer of protection [4].

Soft-copy text is in many ways the most difficult place to hide data; there are number techniques that can be employed in textual steganography [7].

- Open space methods that encodes through manipulation of white space (unused space on the printed page).
- Syntactic methods that utilize punctuation.
- Semantic methods that encode using manipulation of the word themselves.

Therefore this paper combines cryptography with steganography, the sender encrypted the secret message to the code numbers represent each character (codes can be divided into two types ,first fixed length code, or uniform code, or block code :is a code with the same length, while a code with varying lengths, is called a variable length code [1]) prior to the embedded process with table, such combination increases security of the overall communication process, as it is a more difficult for an attracter to detect embedded cipher-text in a table.

The Development Method

Scientific and engineering using different tables with floating-point numbers (see tables 3-1 and 4-1). Some of these tables used for scientific translations as results for lecture curvy or exchanged of these tables as a part of scientific research. The cover image used to hide the information in this research constructed on tables (array with number of rows and columns) see tables 3-1 and 4-1 with the floating-point numbers contains three or more number after the decimal point. In this paper two tables where introduced 3-1 and 4-1 because the both tables contain numeral different floating-point numbers these tables can be used by experimental person for different calculation without drown any suspicion.

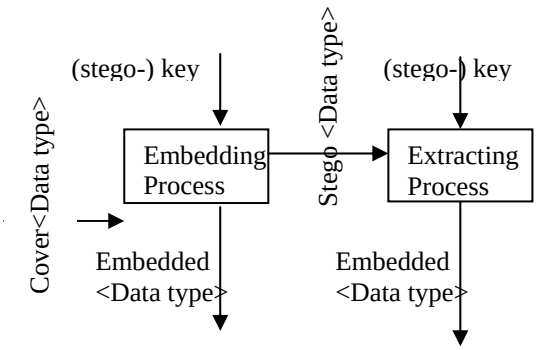

Figure 1
Steganography system (stego-system)

Algorithm operation

i. Embedding process

1. Prepare the input text (secret message).
2. Add $ to the end of secret message to determine the end of input text.
3. Transform each character of secret message into numbers, different methods can be implemented the proposed method in this paper
   - **A.** Transform each character to the ASCII number (using block code each character represented as three numbers ex : the ASCII number for a character a is 97 represented as 097, while the ASCII number for a character d is 100 represented as100) .
   - **B.** Reverse the ASCII number (for the character a is represented as 790, while for the character d is represented as 001).
4. Select the cover table.
5. Determine the position rows or columns, where to hide the message (the sender shares the position with the desired recipient using a secure channel). Sometime information about the secrete message can be stored in the same table with any selected rows or columns , (see table 3-2 first and second rows with bold numbers 003, 004, 009,…etc represent secure message stored in third, fourth, ninth, …etc ending with 036 reveres the ASCII of $).
6. Store the result of step 3 in the determined rows or columns at the end of each floating-point numbers as least significant numbers.
7. Filled reaming rows or columns with the scramble numbers, this operation is done to drown any suspension bout the table.

ii. Extracting Process

To brought the message from the table reversed algorithm is used

1. Prepare covered table, embedded with secret message.
2. Extracting text is done by using information in step 5 in the embedding process.
3. Cut the least three significant number by order until found the number represent the end of the message.
4. Transform numbers to character by
   - **A.** Reverse each three numbers.
   - **B.** Convert each three numbers to the ASCII character.
5. Concatenate characters, so the output will be the input text (secret message).

Examples

i.

1. Secret message (see table1-1).
2. **2-1** Transform secret message to numbers (see table 1-2).

2-2 Reverse the ASCII of each characters (see table 1-3)

1. Use table 3-1 to store the secret message.
2. Cover table 3-2 after embedded secret message, the first and the second reverse of the ASCII character are stored in the column p (psia) ,while the third number is stored in column H^i. The reaming first and second reverse ASCII of character are stored in column H^v and the third number is stored in S^v .(See the least three significant bold numbers in determined columns).

ii.

1. Secret message (see table 2-1).
2. **2-1** Transform the secret message to numbers (see table 2-2).

2-2 Reverse ASCII of each characters (see table 2-3).

3. Use table 4-1 to store the secret message.
4. Cover table 4-2 after embedded secret message, the first and the second rows with bold at the least significant numbers 003, 004, 009,…etc represent secure message stored in third, fourth, ninth, ,…etc ending with 036 is reveres ASCII of $ .Hint the boundary are not used to store any numbers. . (See the least three significant bold numbers in determined rows).

Conclusions and Suggested Work

The conclusions of this paper are focused on

- High redundancy in the table representation. Floating point data represents a much brooders range of numbers that what is really required for the capacity of human senses. For example, the human eye can distinguish different numbers, but only some at the same time.
- Stored information does not change the result of operations, when the tables used by the experimental person.

We suggest the following points for future works

- Lines of table can be used to store any secret information.
- Architectural techniques deal with the problem of floating-point computation at 2D and 3D imaging ,different points for drawing deals with floating point number can be used to store secure messages.
- Development equation to determine the place where storing secret message.

Table 1-1 The first secret message

The goal of steganography is to hide message inside other message "harmless" mess in away that does allow any "enemy" to even detect that there is a second message present.

Table 1-2 Transform the secret message to numbers.

084104**101**032**103**111**097**108**032**111**102**032**115**116**101**103**097**110**111**103**114**097**112** 104**121**032**105**115**032**116**111**032**104**105**100**101**032**109**101**115**115**097**103**101**032**105** 110**115**105**100**101**032**111**116**104**101**114**032**109**101**115**115**097**103**101**032**066**104**097** 114**109**108**101**115**115**066**032**109**101**115**115**032**105**110**032**097**119**097**121**032**116**104** 097**116**032**100**111**101**115**032**097**108**108**111**119**032**097**110**121**032**066**101**110**101**109** 121**066**032**116**111**032**101**118**101**110**032**100**101**116**101**099**116**032**116**032**104**097**116**032** 116**104**101**114**101**032**105**115**032**097**032**115**101**099**111**110**100**032**109**101**115**115**097** 103**101**032**112**114**101**115**101**110**116**046

Table 1-3 Reverse the ASCII of each characters of the first secret message.

480401**101**230**301**111**790**801**230**111**201**230**511**611**101**301**790**011**111**301**411**790**211** 401**121**230**501**511**230**611**111**230**401**501**001**101**230**901**101**511**511**790**301**101**230**501** **011**511**501**001**101**230**111**611**401**101**411**230**901**101**511**511**790**301**101**230**660**401**790** 411**901**801**101**511**511**660**230**901**101**511**511**230**501**011**230**790**911**790**121**230**611**401** **790**611**230**001**111**101**511**230**790**801**801**111**911**230**790**011**121**230**660**101**011**101**901** 121**660**230**611**111**230**101**811**101**011**230**001**101**611**101**990**611**230**611**401**790**611**230** **611**401**101**411**101**230**501**511**230**790**230**511**101**990**111**011**001**230**901**101**511**511**790**

301**101**230**211**411**101**511**101**011**611**640

Table 2-1 The second secret message

Steganography "means" covered writing it is the art of hiding existence of a message.

Table 2-2 Transform secret message to numbers

083**116**101**103**097**110**111**103**114**097**112**104**121**032**066**109**101**097**110**115**066**032**099
111118**101**114**101**100**032**119**114**105**116**105**110**103**032**105**116**032**105**115**032**116**104**
101**032**097**114**116**032**111**102**032**104**105**100**105**110**103**032**101**120**105**115**116**101**110
099101**032**111**102**032**097**032**109**101**115**115**097**103101046

Table 2-3 Reverse the ASCII of each characters of the second secret message

380**611**101**301**790**011**111**301**411**790**211**401**121**230**660**901**101**790**011**511**660**230**990
111811**101**411**101**001**230**911**411**501**611**501**011**301**230**501**611**230**501**511**230**611**401**
101**230**790**411**611**230**111**201**230**401**501**001**501**011**301**230**101**021**501**511**611**101**011
990101**230**111**201**230**790**230**901**101**511**511**790**301**101640**

Table 3-1 Thermodynamic properties of saturated Freon-12 [6]

t(^{0}F)	P(psia)	V^i	V^v	H^i	H^v	S^i	S^v
-40	9.31	0.01056	3.875	0.00	72.91	0.0000	0.1737
-38	9.80	0.01059	3.692	0.42	73.13	0.0010	0.1734
-36	10.32	0.01067	3.520	0.84	73.35	0.0020	0.1731
-34	10.86	0.01063	3.357	1.27	73.58	0.0030	0.1729
-32	11.42	0.01065	3.204	1.69	73.80	0.0040	0.1726
-30	12.00	0.01067	3.059	2.11	74.02	0.0050	0.1723
-28	12.60	0.01070	3.921	2.54	74.23	0.0059	0.1720
-26	13.23	0.01072	3.792	2.96	74.45	0.0069	0.1718
-24	13.89	0.01074	3.669	2.38	74.67	0.0079	0.1715
-22	14.56	0.01076	3.553	3.81	74.89	0.0089	0.1713
-20	15.27	0.01079	3.443	4.24	75.11	0.0098	0.1710
-18	16.00	0.01081	3.339	4.66	75.33	0.0108	0.1708
-16	16.75	0.01083	3.240	5.09	75.55	0.0118	0.1706
-14	17.54	0.01086	3.146	5.52	75.76	0.0127	0.1703
-12	18.35	0.01088	3.057	5.94	75.98	0.0137	0.1701
-10	19.19	0.01091	1.973	6.37	76.20	0.0146	0.1699
-8	20.06	0.01093	1.892	6.80	76.41	0.0156	0.1697
-6	20.96	0.01096	1.816	7.23	76.63	0.0165	0.1695
-4	21.89	0.01098	1.744	7.66	76.84	0.0174	0.1693
-2	22.85	0.01001	1.675	8.09	77.06	0.0181	0.1691
0	23.85	0.01103	1.609	8.52	77.27	0.0193	0.1689
2	24.88	0.01106	1.546	8.95	77.49	0.0203	0.1687
4	25.94	0.01108	1.487	9.38	77.70	0.0212	0.1685
6	27.04	0.01111	1.430	9.82	77.91	0.0221	0.1683
8	28.17	0.01113	1.376	10.25	77.12	0.0230	0.1681
10	29.34	0.01116	1.324	10.68	78.34	0.0240	0.1680
12	30.54	0.01119	1.275	11.12	78.55	0.0249	0.1678
14	31.78	0.01121	1.228	11.55	78.76	0.0258	0.1677
16	33.06	0.01124	1.183	11.99	78.97	0.0267	0.1675
18	34.38	0.01127	1.140	12.43	79.18	0.0276	0.1673
20	35.74	0.01130	1.099	12.86	79.39	0.0285	0.1672
22	37.14	0.01132	1.060	13.30	79.59	0.0294	0.1670
24	38.57	0.01135	1.022	13.74	79.80	0.0203	0.1669
26	40.06	0.01138	0.986	14.18	80.01	0.0312	0.1668
28	41.58	0.01141	0.952	14.62	80.21	0.0321	0.1666
30	43.15	0.01144	0.919	15.06	80.42	0.0330	0.1665
32	44.76	0.01147	0.887	15.50	80.62	0.0339	0.1664
34	46.42	0.01150	0.857	15.94	80.83	0.0348	0.1662
36	48.12	0.01153	0.828	16.38	81.03	0.0357	0.1661
38	49.87	0.01156	0.800	16.83	81.23	0.0366	0.1660
40	51.67	0.01159	0.774	17.27	81.44	0.0375	0.1659
42	53.51	0.01162	0.748	17.72	81.64	0.0383	0.1657
44	55.41	0.01165	0.723	18.16	81.84	0.0392	0.1656
46	57.35	0.01168	0.700	18.61	82.04	0.0401	0.1655
48	59.35	0.01171	0.677	19.06	82.24	0.0410	0.1654
50	61.39	0.01175	0.655	19.51	82.44	0.0418	0.1653

52	63.49	0.01178	0.634	19.96	82.63	0.0427	0.1652
54	65.65	0.01181	0.614	20.41	82.83	0.0436	0.1651
56	67.85	0.01185	0.595	20.86	83.02	0.0444	0.1650
58	70.12	0.01188	0.576	21.31	83.22	0.0453	0.1649
60	72.75	0.01191	0.5584	21.27	83.41	0.0462	0.1648
62	74.81	0.01195	0.5411	22.22	83.60	0.0470	0.1647
64	77.24	0.01198	0.5245	22.68	83.79	0.0479	0.1646
66	79.73	0.01202	0.5085	23.13	83.98	0.0488	0.1645
68	82.28	0.01205	0.4931	23.59	84.17	0.0496	0.1644
70	84.89	0.01209	0.4782	24.05	84.36	0.0505	0.1643
72	87.56	0.01213	0.4638	24.51	84.55	0.0513	0.1643
74	90.29	0.01216	0.4500	24.97	84.73	0.0522	0.1642
76	93.09	0.01220	0.4367	25.44	84.92	0.0530	0.1641
78	95.95	0.01224	0.4238	25.90	85.10	0.0539	0.1640
80	98.87	0.01228	0.4334	26.37	85.28	0.0548	0.1639
82	101.86	0.01232	0.3994	26.83	85.46	0.0556	0.1638
84	104.92	0.01236	0.3878	27.30	85.64	0.0565	0.1638
86	108.04	0.01240	0.3766	27.77	85.82	0.0573	0.1637
88	111.23	0.01244	0.3658	28.24	86.00	0.0581	0.1636
90	114.49	0.01248	0.3553	28.71	86.17	0.0590	0.1636
92	117.82	0.01252	0.3452	29.19	86.35	0.0598	0.1635
94	121.22	0.01256	0.3354	29.66	86.52	0.0507	0.1634
96	124.70	0.01261	0.3259	30.14	86.69	0.0615	0.1633
98	128.24	0.01265	0.3168	30.62	86.86	0.0624	0.1632
100	131.86	0.01269	0.3079	31.10	87.03	0.0632	0.1631
102	135.56	0.01274	0.2994	31.58	87.20	0.0640	0.1631
104	139.33	0.01278	0.2911	32.07	87.36	0.0649	0.1630
106	143.18	0.01283	0.2830	32.55	87.52	0.0658	0.1629
108	147.11	0.01288	0.2752	32.04	87.68	0.0666	0.1629
110	151.11	0.01292	0.2677	33.53	87.48	0.0675	0.1628
112	155.19	0.01297	0.2604	34.02	88.00	0.0683	0.1627
114	159.36	0.01302	0.2533	34.52	88.16	0.0691	0.1626
116	163.61	0.01307	0.2464	35.01	88.31	0.0700	0.1626
118	167.94	0.01312	0.2397	35.51	88.46	0.0708	0.1625
120	172.35	0.01318	0.2333	36.01	88.61	0.0717	0.1624
122	176.85	0.01323	0.2270	36.52	88.76	0.0725	0.1624
124	181.43	0.01328	0.2209	37.02	88.90	0.0734	0.1623
126	186.10	0.01334	0.2150	37.53	89.04	0.0742	0.1622
128	190.86	0.01339	0.2092	38.04	89.18	0.0751	0.1621
130	195.71	0.01345	0.2036	38.55	89.32	0.0759	0.1620
132	200.46	0.01350	0.1982	39.07	89.46	0.0768	0.1619
134	205.67	0.01356	0.1929	39.59	89.59	0.0776	0.1619
136	210.79	0.01362	0.1878	40.11	89.72	0.0785	0.1618
138	216.01	0.01368	0.1828	40.63	89.84	0.0793	0.1617
140	221.32	0.01375	0.1780	41.16	89.97	0.0802	0.1616
142	226.72	0.01381	0.1733	41.69	90.09	0.0811	0.1615
144	232.22	0.01387	0.1687	42.23	90.20	0.0819	0.1614
146	237.82	0.01394	0.1642	42.77	90.32	0.0828	0.1613
148	243.51	0.01401	0.1599	43.31	90.43	0.0837	0.1612
150	249.31	0.01408	0.1556	43.85	90.53	0.0845	0.1611
152	255.20	0.01415	0.1515	44.40	90.64	0.0854	0.1610
154	261.20	0.01422	0.1475	44.95	90.74	0.0863	0.1609
156	267.30	0.01440	0.1436	45.15	90.83	0.0872	0.1608
158	273.51	0.01437	0.1398	45.07	90.92	0.0880	0.1687

Table 3-2 Thermodynamic properties of saturated Freon-12 [6]

$t(^0F)$	P(psia)	V^i	V^v	H^i	H^v	S^i	S^v
-40	9.31**48**	0.01056	3.875	0.00**0**	72.91**7**	0.0000**9**	0.1737**0**
-38	9.80**40**	0.01059	3.692	0.42**1**	73.13**8**	0.0010**0**	0.1734**1**
-36	10.32**10**	0.01067	3.520	0.84**1**	73.35**8**	0.0020**0**	0.1731**1**
-34	10.86**23**	0.01063	3.357	1.27**0**	73.58**1**	0.0030**1**	0.1729**1**
-32	11.42**30**	0.01065	3.204	1.69**1**	73.80**9**	0.0040**1**	0.1726**1**
-30	12.00**11**	0.01067	3.059	2.11**1**	74.02**2**	0.0050**3**	0.1723**0**
-28	12.60**79**	0.01070	3.921	2.54**0**	74.23**7**	0.0059**9**	0.1720**0**
-26	13.23**80**	0.01072	3.792	2.96**1**	74.45**0**	0.0069**1**	0.1718**1**
-24	13.89**23**	0.01074	3.669	2.38**0**	74.67**1**	0.0079**2**	0.1715**1**
-22	14.56**11**	0.01076	3.553	3.81**1**	74.89**2**	0.0089**3**	0.1713**0**
-20	15.27**20**	0.01079	3.443	4.24**1**	75.11**6**	0.0098**6**	0.1710**0**
-18	16.00**23**	0.01081	3.339	4.66**0**	75.33**1**	0.0108**0**	0.1708**1**
-16	16.75**51**	0.01083	3.240	5.09**1**	75.55**0**	0.0118**1**	0.1706**1**
-14	17.54**61**	0.01086	3.146	5.52**1**	75.76**1**	0.0127**0**	0.1703**1**
-12	18.35**10**	0.01088	3.057	5.94**1**	75.98**9**	0.0137**0**	0.1701**1**

-10	19.193**0**	0.01091	1.973	6.37**1**	76.20**1**	0.0146**2**	0.1699**1**
-8	20.067**9**	0.01093	1.892	6.80**0**	76.41**6**	0.0156**6**	0.1697**0**
-6	20.960**1**	0.01096	1.816	7.23**1**	76.63**2**	0.0165**3**	0.1695**0**
-4	21.891**1**	0.01098	1.744	7.66**1**	76.84**6**	0.0174**1**	0.1693**1**
-2	22.853**0**	0.01001	1.675	8.09**1**	77.06**1**	0.0181**1**	0.1691**1**
0	23.854**1**	0.01103	1.609	8.52**1**	77.27**2**	0.0193**3**	0.1689**0**
2	24.887**9**	0.01106	1.546	8.95**0**	77.49**1**	0.0203**0**	0.1687**1**
4	25.942**1**	0.01108	1.487	9.38**1**	77.70**8**	0.0212**1**	0.1685**1**
6	27.044**0**	0.01111	1.430	9.82**1**	77.91**1**	0.0221**0**	0.1683**1**
8	28.171**2**	0.01113	1.376	10.25**1**	77.12**0**	0.0230**1**	0.1681**1**
10	29.342**3**	0.01116	1.324	10.68**0**	78.34**2**	0.0240**3**	0.1680**0**
12	30.545**0**	0.01119	1.275	11.12**1**	78.55**0**	0.0249**0**	0.1678**1**
14	31.785**1**	0.01121	1.228	11.55**1**	78.76**1**	0.0258**0**	0.1677**1**
16	33.062**3**	0.01124	1.183	11.99**0**	78.97**6**	0.0267**1**	0.1675**1**
18	34.386**1**	0.01127	1.140	12.43**1**	79.18**1**	0.0276**0**	0.1673**1**
20	35.741**1**	0.01130	1.099	12.86**1**	79.39**9**	0.0285**9**	0.1672**0**
22	37.142**3**	0.01132	1.060	13.30**0**	79.59**6**	0.0294**1**	0.1670**1**
24	38.574**0**	0.01135	1.022	13.74**1**	79.80**2**	0.0203**3**	0.1669**0**
26	40.065**0**	0.01138	0.986	14.18**1**	80.01**6**	0.0312**1**	0.1668**1**
28	41.580**0**	0.01141	0.952	14.62**1**	80.21**4**	0.0321**0**	0.1666**1**
30	43.151**0**	0.01144	0.919	15.06**1**	80.42**7**	0.0330**9**	0.1665**0**
32	44.762**3**	0.01147	0.887	15.50**0**	80.62**6**	0.0339**1**	0.1664**1**
34	46.429**0**	0.01150	0.857	15.94**1**	80.83**2**	0.0348**3**	0.1662**0**
36	48.121**0**	0.01153	0.828	16.38**1**	81.03**6**	0.0357**1**	0.1661**1**
38	49.875**1**	0.01156	0.800	16.83**1**	81.23**4**	0.0366**0**	0.1660**1**
40	51.675**1**	0.01159	0.774	17.27**1**	81.44**1**	0.0375**0**	0.1659**1**
42	53.517**9**	0.01162	0.748	17.72**0**	81.64**4**	0.0383**1**	0.1657**1**
44	55.413**0**	0.01165	0.723	18.16**1**	81.84**1**	0.0392**0**	0.1656**1**
46	57.351**0**	0.01168	0.700	18.61**1**	82.04**2**	0.0401**3**	0.1655**0**
48	59.352**3**	0.01171	0.677	19.06**0**	82.24**5**	0.0410**0**	0.1654**1**
50	61.395**0**	0.01175	0.655	19.51**1**	82.44**5**	0.0418**1**	0.1653**1**
52	63.490**1**	0.01178	0.634	19.96**1**	82.63**2**	0.0427**3**	0.1652**0**
54	65.655**1**	0.01181	0.614	20.41**1**	82.83**7**	0.0436**9**	0.1651**0**
56	67.855**0**	0.01185	0.595	20.86**1**	83.02**2**	0.0444**3**	0.1650**0**
58	70.120**0**	0.01188	0.576	21.31**1**	83.22**5**	0.0453**1**	0.1649**1**
60	72.751**0**	0.01191	0.5584	21.27**1**	83.41**1**	0.0462**0**	0.1648**1**
62	74.812**3**	0.01195	0.5411	22.22**0**	83.60**9**	0.0470**9**	0.1647**0**
64	77.241**1**	0.01198	0.5245	22.68**1**	83.79**1**	0.0479**1**	0.1646**1**
66	79.736**1**	0.01202	0.5085	23.13**1**	83.98**0**	0.0488**1**	0.1645**1**
68	82.284**0**	0.01205	0.4931	23.59**1**	84.17**0**	0.0496**0**	0.1644**1**
70	84.891**0**	0.01209	0.4782	24.05**1**	84.36**2**	0.0505**3**	0.1643**0**
72	87.564**1**	0.01213	0.4638	24.51**1**	84.55**9**	0.0513**0**	0.1643**1**
74	90.292**3**	0.01216	0.4500	24.97**0**	84.73**1**	0.0522**0**	0.1642**1**
76	93.099**0**	0.01220	0.4367	25.44**1**	84.92**5**	0.0530**1**	0.1641**1**
78	95.951**0**	0.01224	0.4238	25.90**1**	85.10**5**	0.0539**1**	0.1640**1**
80	98.875**1**	0.01228	0.4334	26.37**1**	85.28**7**	0.0548**9**	0.1639**0**
82	101.865**1**	0.01232	0.3994	26.83**1**	85.46**3**	0.0556**0**	0.1638**1**
84	104.927**9**	0.01236	0.3878	27.30**0**	85.64**1**	0.0565**0**	0.1638**1**
86	108.043**0**	0.01240	0.3766	27.77**1**	85.82**2**	0.0573**3**	0.1637**0**
88	111.231**0**	0.01244	0.3658	28.24**1**	86.00**2**	0.0581**1**	0.1636**1**
90	114.492**3**	0.01248	0.3553	28.71**0**	86.17**4**	0.0590**1**	0.1636**1**
92	117.826**6**	0.01252	0.3452	29.19**0**	86.35**1**	0.0598**0**	0.1635**1**
94	121.224**0**	0.01256	0.3354	29.66**1**	86.52**5**	0.0507**1**	0.1634**1**
96	124.707**9**	0.01261	0.3259	30.14**0**	86.69**1**	0.0615**0**	0.1633**0**
98	128.244**1**	0.01265	0.3168	30.62**1**	86.86**0**	0.0624**1**	0.1632**1**
100	131.869**0**	0.01269	0.3079	31.10**1**	87.03**6**	0.0632**1**	0.1631**1**
102	135.568**0**	0.01274	0.2994	31.58**1**	87.20**6**	0.0640**4**	0.1631**0**
104	139.331**0**	0.01278	0.2911	32.07**1**	87.36**0**	0.0649**3**	0.1630**6**
106	143.185**1**	0.01283	0.2830	32.55**1**	87.528	0.06582	0.16294
108	147.115**1**	0.01288	0.2752	32.04**1**	87.680	0.06668	0.16295
110	151.116**6**	0.01292	0.2677	33.53**0**	87.484	0.06756	0.16284
112	155.192**3**	0.01297	0.2604	34.02**0**	88.004	0.06835	0.16276
114	159.369**0**	0.01302	0.2533	34.52**1**	88.169	0.06914	0.16263
116	163.611**0**	0.01307	0.2464	35.01**1**	88.317	0.07001	0.16269
118	167.945**1**	0.01312	0.2397	35.51**1**	88.465	0.07085	0.16257
120	172.355**1**	0.01318	0.2333	36.01**1**	88.615	0.07177	0.16242
122	176.852**3**	0.01323	0.2270	36.52**0**	88.761	0.07252	0.16240
124	181.435**0**	0.01328	0.2209	37.02**1**	88.904	0.07343	0.16230
126	186.100**1**	0.01334	0.2150	37.53**1**	89.047	0.07424	0.16224
128	190.862**3**	0.01339	0.2092	38.04**0**	89.189	0.07514	0.16212
130	195.717**9**	0.01345	0.2036	38.55**0**	89.320	0.07597	0.16201
132	200.469**1**	0.01350	0.1982	39.07**1**	89.468	0.07682	0.16193
134	205.677**9**	0.01356	0.1929	39.59**0**	89.595	0.07765	0.16198
136	210.791**2**	0.01362	0.1878	40.11**1**	89.728	0.07854	0.16184
138	216.012**3**	0.01368	0.1828	40.63**0**	89.848	0.07932	0.16171

140	221.32**61**	0.01375	0.1780	41.16**1**	89.974	0.08020	0.16161
142	226.72**40**	0.01381	0.1733	41.69**1**	90.099	0.08110	0.16152
144	232.22**79**	0.01387	0.1687	42.23**0**	90.200	0.08196	0.16146
146	237.82**61**	0.01394	0.1642	42.77**1**	90.323	0.08283	0.16139
148	243.51**23**	0.01401	0.1599	43.31**0**	90.434	0.08379	0.16128
150	249.31**00**	0.01408	0.1556	43.85**1**	90.536	0.08450	0.16115
152	255.20**11**	0.01415	0.1515	44.40**1**	90.647	0.08544	0.16102
154	261.20**10**	0.01422	0.1475	44.95**1**	90.744	0.08633	0.16095
156	267.30**51**	0.01440	0.1436	45.15**1**	90.836	0.08727	0.16084
158	273.51**23**	0.01437	0.1398	45.07**0**	90.920	0.08809	0.16873

Table 4-1 Treatment of singularities [2]

1.0001	0.9166	0.8313	0.7424	0.6487	0.5495	0.4453	0.3371	0.2261	0.1134	0.0000
1.0000	0.9163	0.8315	0.7426	0.6486	0.5500	0.4452	0.3376	0.2257	0.1140	0.0000
1.0000	0.9175	0.8831	0.7449	0.6515	0.5521	0.4474	0.3385	0.2269	0.1138	0.0000
1.0000	0.9175	0.8331	0.6450	0.6516	0.5524	0.4477	0.3387	0.2271	0.1139	0.0000
1.0000	0.9204	0.8387	0.7527	0.6603	0.5604	0.4536	0.3425	0.2291	0.1147	0.0000
1.0000	0.9204	0.8388	0.7528	0.6605	0.5606	0.4539	0.3428	0.2294	0.1149	0.0000
1.0000	0.9254	0.8487	0.7671	0.6772	0.5756	0.4642	0.3486	0.2323	0.1161	0.0000
1.0000	0.9254	0.8487	0.7672	0.6774	0.5760	0.4646	0.3490	0.2326	0.1162	0.0000
1.0000	0.9325	0.8633	0.7898	0.7066	0.6019	0.4780	0.3549	0.2352	0.1172	0.0000
1.0000	0.9324	0.8632	0.7897	0.7066	0.6026	0.4788	0.3555	0.2355	0.1174	0.0000
1.0000	0.9412	0.8818	0.8210	0.7565	0.6667	0.4869	0.3579	0.2364	0.1177	0.0000
1.0000	0.9411	0.8816	0.8207	0.7560	0.6663	0.4884	0.3580	0.2371	0.1170	0.0000
1.0000	0.9503	0.9015	0.8553	0.8154	0.7961					
1.0000	0.9502	0.9013	0.8548	0.8146	0.7948					
1.0000	0.9585	0.9191	0.8843	0.8587	0.8487					
1.0000	0.9584	0.9188	0.8839	0.8581	0.8482					
1.0000	0.9648	0.9322	0.9048	0.8860	0.8793					
1.0000	0.9647	0.9319	0.9044	0.8856	0.8787					
1.0000	0.9687	0.9400	0.9166	0.9012	0.9857					
1.0000	0.9686	0.9398	0.9163	0.9007	0.8953					
0.9999	0.9700	0.9427	0.9205	0.9060	0.9009					
1.0000	0.9698	0.9425	0.9202	0.9055	0.9005					

Table 4-2 Treatment of singularities with secret-message

1.0001000	0.9166**022**	0.8313**011**	0.7424**018**	0.6487**036**	0.5495402	0.4453024	0.3371064	0.2261131	0.1134162	0.0000000
1.0000000	0.9175**380**	0.8831**611**	0.7449**101**	0.6515**301**	0.5521**790**	0.4474**011**	0.3385**111**	0.2269**301**	0.1138**411**	0.0000000
1.0000000	0.9175**790**	0.8331**211**	0.6450**401**	0.6516**121**	0.5524**230**	0.4477**660**	0.3387**901**	0.2271**101**	0.1139**790**	0.0000000
1.0000000	0.9204134	0.8387981	0.7527457	0.6603562	0.5604469	0.4536895	0.3425674	0.2291781	0.1147981	0.0000000
1.0000000	0.9204871	0.8388387	0.7528201	0.6605004	0.5606764	0.4539975	0.3428682	0.2294968	0.1149865	0.0000000
1.0000000	0.9254**101**	0.8487**001**	0.7671**230**	0.6772**911**	0.5756**411**	0.4642**501**	0.3486**611**	0.2323**501**	0.1161**011**	0.0000000
1.0000000	0.9254004	0.8487505	0.7672908	0.6774200	0.5760001	0.4646452	0.349023	0.232617	0.116287	0.000000
1.000000	0.9325**011**	0.8633**511**	0.7898**660**	0.7066**230**	0.6019**990**	0.4780**111**	0.3549**811**	0.2352**101**	0.1172**411**	0.0000000
1.000000	0.9324**501**	0.8632**511**	0.7897**230**	0.7066**611**	0.6026**401**	0.4788**101**	0.3555**230**	0.2355**790**	0.1174**411**	0.0000000
1.0000000	0.9412**230**	0.8818**111**	0.8210**201**	0.7565**230**	0.6667**790**	0.48690**230**	0.3579**901**	0.2364**101**	0.1177**511**	0.0000000
1.0000000	0.9411172	0.8816965	0.8207412	0.7560407	0.6663894	0.4884564	0.3580406	0.2371349	0.1170004	0.0000000

1.0000000	0.9503673	0.9015697	0.8553865	0.8154172	0.7961563
1.0000000	0.9502**230**	0.9013**101**	0.8548**021**	0.8146**501**	0.7948**511**
1.0000000	0.9585**301**	0.9191**230**	0.8843**501**	0.8587**611**	0.8487**230**
1.0000000	0.9584655	0.9188287	0.8839716	0.8581016	0.8482363
1.0000000	0.9648**611**	0.9322**230**	0.9048**111**	0.8860**201**	0.8793**230**
1.0000000	0.9647**790**	0.9319**301**	0.9044**101**	0.8856**640**	0.8787**036**
1.0000000	0.9687062	0.9400005	0.9166766	0.9012683	0.9857856
1.0000000	0.9686**501**	0.9398**001**	0.9163**501**	0.9007**011**	0.8953**301**
0.9999999	0.9700000	0.9427243	0.9205543	0.9060203	0.9009563
1.0000000	0.9698**611**	0.9425**101**	0.9202**011**	0.9055**990**	0.9005**101**

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