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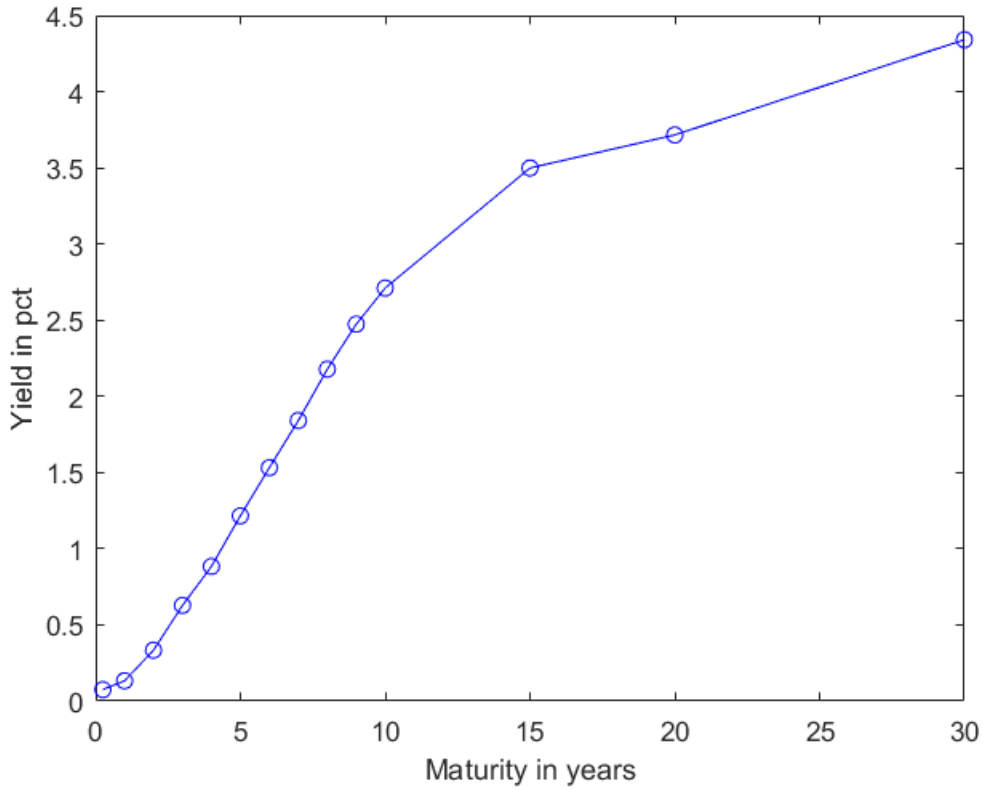
Fitting a yield curve to bond data using Matlab's Financial Instruments Toolbox

Financial market analysis of fixed income markets typically rely on the availability of yield curve data. That is, at the outset, yield observations for the relevant market segments are directly observable at the desired maturities. For example, it is possible to download yield curve data from Bloomberg, the FRED data base, and ECB's statistical data warehouse. Such data comprise the date of observation, the maturities at which yields are observed, and then the actual yield curve data points. To illustrate, Figure 1 shows the Spanish Government zero coupon yield curve for Monday 11 August 2014 (close of business), as displayed by Bloomberg, for maturities ranging from 3 months to 30 years.

```
y_ES = [0.075; 0.133; 0.334; 0.628; 0.884; 1.216; 1.532; ...
        1.841; 2.178; 2.474; 2.711; 3.499; 3.716; 4.341];

tau_ = [ 3; 12; 24; 36; 48; 60; 72; 84; 96; 108; 120; 180; 240;
 360]./12;

figure
plot(tau_,y_ES,'-ob'), ... %title('Figure 1: Spain - Gov Curve on 11
 AUG 2014'), ...
                     xlabel('Maturity in years'), ylabel('Yield in
 pct')

saveas(gcf,'Spain_Gov.eps', 'psc2')
```



Since zero coupon instruments typically do not trade trade throughout the maturity spectrum, it is necessary to construct the zero coupon curve from underlying (traded) coupon bonds. Bloomberg and other providers of yield curve data perform such calculations by default; but it is naturally relevant to be able to reproduce such calculations. Firstly, as a means to double check and to gain an understanding of how such processes work, and secondly, and more importantly, by mastering the curve extraction methodology it is possible to create proprietary curves for yield curve segments that are not available from the licensed curve contributors, or as a means to create curves for combinations of curve segments that may be needed for ad-hoc analyses.

In principle, the required calculations are very simple, and of course, relies on the discounting of future cashflows. Define a universe of traded bonds that forms the foundation for the zero coupon yield curve calculations. These bonds should be activily traded and representative for the market segments under investigation. Let there by j bonds in the universe, and denote by p the vector that collects the j observed prices for these bonds, and by C the matrix that collects their cashflows. Since the price of a bond is equal to the sum of the discounted future payments, the following holds: $p = C \cdot d$, where d is the vector of discount factors. Zero coupon yields y are related to discount factors as $y_j = d^{-1/j} - 1$. Under the assumption that C is invertible, the discount factors can then be found as: $d = C^{-1} \cdot p$, which then subsequiently can be converted in to zero coupn yield. The following examples illustrates this principle for the first four maturities, using constructed/hypothetical bond price data:

```
j  = (1:1:4)';
p  = [ 99.87; 105.82; 104.35; 112.75 ];

C  = [ 100.00    0.00    0.00    0.00 ;
```

```
          3.25  103.25    0.00    0.00 ;
          2.10    2.10  102.10    0.00 ;
          4.10    4.10    4.10  104.10 ];

d  = C^-1*p;

yz = ( d.^(-1./j)-1 ).*100;

figure
plot(tau_,y_ES,'-ob'), ... % title('Figure 1: Spain - Gov Curve on 11
 AUG 2014'), ...
                      xlabel('Maturity in years'), ylabel('Yield in
 pct')
hold on
plot(j,yz,'g*')

saveas(gcf,'ZeroYC_stylised.eps', 'psc2')
```

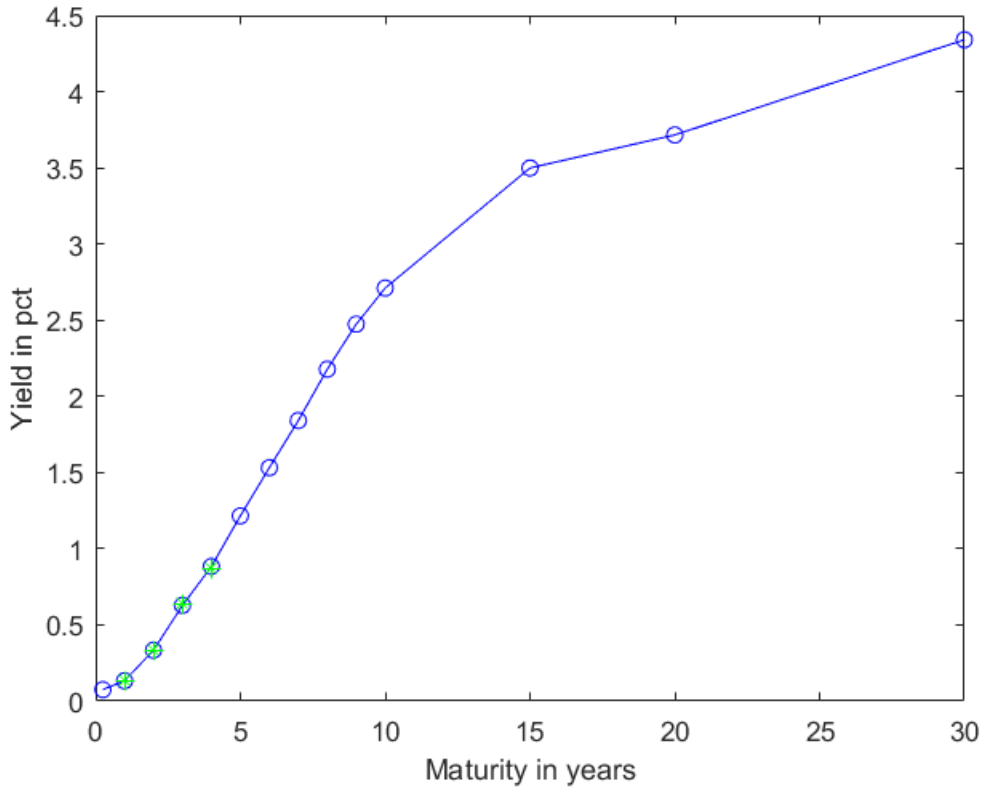


Figure 2 plots the calculated (example) zero rates together with the observed curve. The data used for this illustration were constructed on the basis of the characteristics of the bonds that actually underpin Bloombergs zero curve calculations. Using the coupons of these bonds, the prices were adjusted slightly to provide zero yields that are close to those seen in Figure 1.

While the above example seems easy to implement and provides results that are close to the observed Bloomberg zero yields, it is far from being implementable to real-life data. Bonds that trade in the markets are not necessary well spaced through out the maturity spectrum. Government bonds are used by the sovereign treasury department to fund the government debt. In doing so, issuances are timed and maturities are

structured such that the debt is best serviced. Therefore, it cannot be guaranteed that liquidly traded bonds span all maturities as desired by the financial econometrician. In case that gaps emerge in the maturity spectrum, it is necessary to apply some form of interpolation methodology, to close the gaps. In addition, the maturity profile of the outstanding bonds change as time passes: a bond with a maturity of one year today, becomes a bond with a residual maturity of eleven months, one month from now. Another complicating issue relates to the 'book-keeping' of nitty-gritty bond specific details and how these affect the discount factors. Bonds can be issued using different 'day-count' conventions, i.e. different ways by which interests accrue according to agreed calendar-function schemes, e.g. actual/actual, 30/360, actual/360 and so on. Furthermore, coupons can be paid annually, semi-annually, quarterly, etc.

Matlab's Financial Instruments Toolbox provides a means to estimate zero coupon curves while ensuring correct 'book-keeping' of the bond specific details, as well as three readily available curve interpolation techniques. The R2012b version of this toolbox allows for interpolation to be performed using the Nelson-Siegel, Svensson (-Soderlind), and Smoothing Splines. As shown below, user specific functions can be implemented as well. Once the parameters of the chosen model specification has been estimated, Matlab will provide the zero coupon curve, the instantaneous forward curve, the par-yield curve, and discount factors.

In order to perform the calculations, the 'IRFunctionCurve' object has to be populated with data and parameters. The parameters are entered in several rounds. First, the ones that characterise the precision of the estimated parameters. These are entered via the Matlab structure 'optimset':

```
optOptions_  = optimset('TolFun', 1e-12, 'TolX', 1e-12, 'MaxFunEvals',
 1e12, ...
                        'MaxIter', 1e12, 'Display', 'iter' );
```

Here it is specified that convergence of the objective function is achieved when the it changes by less than 1e-12 from one iteration to the next ('TolFun'), or when the parameters of the objective function changes by less than 1e-12 from one iteration to the next ('TolX'). The number of calculations that are allowed before the optimisation algorithm terminates without finding am optimal solution is specified by 'MaxFunEvals' and 'MaxIter'. In other words, the algorithm will terminate after 1e12 calculation atempts unless the an optimal solution is found before, where the optimality criterion is specified by the values entered for the variables 'TolFun' and 'Tolx'.

Options that govern the interest rate curve fit are provided through the 'IRFitOptions' structure. The choices made for the optimisation algorithm via 'optimset' must also be passed to Matlab via this structure.

```
b_0  = [ 4.00  -3.00  0.40  -0.50  3.50  1.50 ];
lb_  = [ 0.00  -inf  -inf  -inf   0.00  0.00 ];
ub_  = [ 25.0   inf   inf   inf    inf   inf ];

fitOptions_ss  =
 IRFitOptions(b_0, 'FitType', 'durationweightedprice', ...
                                    'LowerBound', lb_, 'UpperBound',
 ub_, ...
                                    'OptOptions', optOptions_ );
```

Starting values for the optimisation process is provided via the variable 'b_0' and lower and upper bounds for the parameters are fed to Matlab via the variables lb_ and ub_, respectively. It is important to note that different targets can be specified for the employed optimisation algorithm. This is done via variable 'FitType', which can take on the values 'yield', 'price', 'DurationWeightedPrice', depending on which criterion the user wants to employ. The parameters of the objective function is found by minimising the sum of squared residuals between an observed quantity and the corresponding model quantity. 'FitType' allows the user to decide whether it is the residuals calculated from yields, prices or duration weighted prices that are minimised.

Lastly, the model must be estimated. This is done through an 'IRFunctionCurve' call to a specific fitting function: '.fitSvensson', '.fitNelsonSiegel', or 'fitSmoothingSpline'.

The data used in the example below are again taken from Bloomberg. In fact, the bonds included are the ones that underpin Bloomberg's calculations of the Spanish zero coupon curve shown in Figure 1.

```
p_   = [99.989; 99.974; 99.937; 99.897; 105.128; 104.15; ...
        112.545; 107.49; 114.015; 123.958; 126.74; 116.093; ...
        100.863; 121.748; 131.85; 109.628; 122.798 ];

cpn_ = [ 0.00; 0.00; 0.00; 0.00; 3.25; 2.10; 4.10; 2.75; ...
         4.00; 5.50; 5.85; 4.40; 2.75; 5.15; 5.75; 4.20; 5.15]./100;

maturity_ =
 datenum([ '17/10/2014'; '23/01/2015'; '10/04/2015'; '17/07/2015'; ...

  '30/04/2016'; '30/04/2017'; '30/07/2018'; '30/04/2019'; ...

  '30/04/2020'; '30/04/2021'; '31/01/2022'; '31/10/2023'; ...

  '31/10/2024'; '31/10/2028'; '30/07/2032'; '31/01/2037'; ...
            '31/10/2044' ], 'dd/mm/yyyy');

settle_      = repmat(datenum(['11/08/2014'],'dd/mm/
yyyy'),length(p_),1);

Instruments_ = [ settle_ maturity_ p_ cpn_ ];

cpn_freq     = [ 0; 0; 0; 0; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1 ];

day_cnt      = [ 0; 0; 0; 0; 8; 8; 8; 8; 8; 8; 8; 8; 8; 8; 8; 8; 8 ];
```

The variable 'p_' collects the observed prices, 'cpn_' contains the coupon rates paid by the bonds, 'maturity_' holds the dates at which the bonds mature and 'settle_' is the settlement date.

```
est_Svensson = IRFunctionCurve.fitSvensson('Zero', settle_(1,1),
 Instruments_, ...
                                            'Compounding',
 -1, ...
                                            'Basis', 8, ...
                                            'InstrumentPeriod',
 cpn_freq, ...
                                            'InstrumentBasis',
 day_cnt, ...
                                            'IRFitOptions',
 fitOptions_ss);


                                    Norm of      First-order
 Iteration  Func-count     f(x)          step          optimality
     0          7         16.6628                        57.5
     1         14         6.47823           10             36
     2         21        0.291121        4.63841           1.57
     3         28        0.291121        5.50402           1.57
```

4	35	0.218658	1.376	0.659
5	42	0.207102	2.75201	3.12
6	49	0.132385	0.688002	0.0829
7	56	0.103093	1.376	0.166
8	63	0.085767	1.376	0.468
9	70	0.0595909	1.46126	0.462
10	77	0.0564197	1.01103	0.487
11	84	0.0564197	1.41969	0.487
12	91	0.0549547	0.354923	0.0492
13	98	0.054384	0.709847	0.206
14	105	0.0538972	0.709847	0.161
15	112	0.0534074	0.177462	0.396
16	119	0.0530611	0.354923	0.0881
17	126	0.0525856	0.354923	0.503
18	133	0.0523207	0.354923	0.0908
19	140	0.0519191	0.354923	0.735
20	147	0.0516872	0.354923	0.0879
21	154	0.0513142	0.354923	0.934
22	161	0.0512716	0.709847	0.0952
23	168	0.0510004	0.177462	0.911
24	175	0.0508122	0.354923	0.0788
25	182	0.0504846	0.354923	0.94
26	189	0.0504034	0.709847	0.0644
27	196	0.0502235	0.709847	0.664
28	203	0.0501721	0.709847	0.0695
29	210	0.0499781	0.177462	0.729
30	217	0.0498945	0.354923	0.0279
31	224	0.0497953	0.709847	0.356
32	231	0.0497953	1.41969	0.356
33	238	0.0497615	0.354923	0.0181
34	245	0.0496944	0.709847	0.324
35	252	0.0496944	1.41969	0.324
36	259	0.0496664	0.354923	0.0145
37	266	0.0496094	0.709847	0.29
38	273	0.0496094	1.41969	0.29
39	280	0.0495864	0.354923	0.0103
40	287	0.0495379	0.709847	0.271
41	294	0.0495379	1.41969	0.271
42	301	0.0495182	0.354923	0.00901
43	308	0.0494758	0.709847	0.27
44	315	0.0494758	1.41969	0.27
45	322	0.0494578	0.354923	0.0077
46	329	0.0494199	0.709847	0.282
47	336	0.0494199	1.41969	0.282
48	343	0.0494025	0.354923	0.00642
49	350	0.04937	0.709847	0.273
50	357	0.04937	1.41969	0.273
51	364	0.0493543	0.354923	0.00537
52	371	0.0493296	0.709847	0.203
53	378	0.0493296	1.41969	0.203
54	385	0.0493185	0.354923	0.00459
55	392	0.0492998	0.709847	0.156
56	399	0.0492998	1.41969	0.156
57	406	0.0492914	0.354923	0.0043

58	413	0.049277	0.709847	0.0984
59	420	0.049277	1.41969	0.0984
60	427	0.0492708	0.354923	0.00426
61	434	0.0492591	0.709847	0.0769
62	441	0.0492591	1.41969	0.0769
63	448	0.0492539	0.354923	0.00441
64	455	0.0492437	0.709847	0.0646
65	462	0.0492437	1.41969	0.0646
66	469	0.0492392	0.354923	0.00503
67	476	0.0492302	0.709847	0.06
68	483	0.0492302	1.41969	0.06
69	490	0.0492261	0.354923	0.00545
70	497	0.0492179	0.709847	0.0563
71	504	0.0492179	1.41969	0.0563
72	511	0.0492143	0.354923	0.00536
73	518	0.0492069	0.709847	0.0529
74	525	0.0492069	1.41969	0.0529
75	532	0.0492036	0.354923	0.005
76	539	0.0491968	0.709847	0.0498
77	546	0.0491968	1.41969	0.0498
78	553	0.0491938	0.354923	0.00452
79	560	0.0491877	0.709847	0.0471
80	567	0.0491877	1.41969	0.0471
81	574	0.049185	0.354923	0.00408
82	581	0.0491794	0.709847	0.0447
83	588	0.0491792	1.41969	0.0293
84	595	0.0491676	0.354923	0.00391
85	602	0.0491639	0.709847	0.0397
86	609	0.0491634	1.41969	0.0281
87	616	0.0491537	0.354923	0.0142
88	623	0.0491509	0.709847	0.00409
89	630	0.0491477	1.41969	0.0439
90	637	0.0491459	1.41969	0.0352
91	644	0.0491346	0.354923	0.0537
92	651	0.0491322	0.709847	0.00582
93	658	0.0491286	1.41969	0.0214
94	665	0.0491256	1.41969	0.0259
95	672	0.0491166	1.41969	0.0423
96	679	0.0491166	2.83939	0.0423
97	686	0.0491135	0.709847	0.0156
98	693	0.0491088	1.41969	0.032
99	700	0.0491062	1.41969	0.0263
100	707	0.0490984	1.41969	0.0253
101	714	0.0490984	2.83939	0.0253
102	721	0.0490961	0.709847	0.0101
103	728	0.0490932	1.41969	0.0208
104	735	0.0490907	1.41969	0.0203
105	742	0.0490858	1.41969	0.0142
106	749	0.0490858	2.83939	0.0142
107	756	0.0490839	0.709847	0.00719
108	763	0.0490821	1.41969	0.0157
109	770	0.04908	1.41969	0.0164
110	777	0.0490766	1.41969	0.0115
111	784	0.0490766	2.83939	0.0115

112	791	0.049075	0.709847	0.00388
113	798	0.0490738	1.41969	0.0178
114	805	0.0490723	1.41969	0.0157
115	812	0.0490696	1.41969	0.0102
116	819	0.0490696	2.83939	0.0102
117	826	0.0490683	0.709847	0.0024
118	833	0.0490671	1.41969	0.0219
119	840	0.0490671	2.83939	0.0219
120	847	0.0490663	0.709847	0.00503
121	854	0.0490651	1.41969	0.00866
122	861	0.0490651	2.83939	0.00866
123	868	0.0490641	0.709847	0.00246
124	875	0.0490632	1.41969	0.0174
125	882	0.0490632	2.83939	0.0174
126	889	0.0490624	0.709847	0.004
127	896	0.0490614	1.41969	0.00766
128	903	0.0490614	2.83939	0.00766
129	910	0.0490606	0.709847	0.00227
130	917	0.0490597	1.41969	0.0185
131	924	0.0490597	2.83939	0.0185
132	931	0.0490592	0.709847	0.00352
133	938	0.0490583	1.41969	0.00689
134	945	0.0490583	2.83939	0.00689
135	952	0.0490576	0.709847	0.0021
136	959	0.0490568	1.41969	0.0177
137	966	0.0490568	2.83939	0.0177
138	973	0.0490564	0.709847	0.0028
139	980	0.0490556	1.41969	0.00608
140	987	0.0490556	2.83939	0.00608
141	994	0.0490551	0.709847	0.002
142	1001	0.0490544	1.41969	0.0159
143	1008	0.0490544	2.83939	0.0159
144	1015	0.049054	0.709847	0.00258
145	1022	0.0490534	1.41969	0.00527
146	1029	0.0490534	2.83939	0.00527
147	1036	0.0490529	0.709847	0.0019
148	1043	0.0490523	1.41969	0.0145
149	1050	0.0490523	2.83939	0.0145
150	1057	0.049052	0.709847	0.0024
151	1064	0.0490514	1.41969	0.0045
152	1071	0.0490514	2.83939	0.0045
153	1078	0.049051	0.709847	0.00182
154	1085	0.0490505	1.41969	0.0134
155	1092	0.0490505	2.83939	0.0134
156	1099	0.0490502	0.709847	0.00224
157	1106	0.0490497	1.41969	0.00391
158	1113	0.0490497	2.83939	0.00391
159	1120	0.0490494	0.709847	0.00173
160	1127	0.0490489	1.41969	0.0127
161	1134	0.0490489	2.83939	0.0127
162	1141	0.0490487	0.709847	0.00212
163	1148	0.0490483	1.41969	0.0042
164	1155	0.0490483	2.83939	0.0042
165	1162	0.049048	0.709847	0.00165

166	1169	0.0490476	1.41969	0.0121
167	1176	0.0490476	2.83939	0.0121
168	1183	0.0490473	0.709847	0.00201
169	1190	0.049047	1.41969	0.00447
170	1197	0.049047	2.83939	0.00447
171	1204	0.0490467	0.709847	0.00157
172	1211	0.0490463	1.41969	0.0118
173	1218	0.0490463	2.83939	0.0118
174	1225	0.0490462	0.709847	0.00192
175	1232	0.0490458	1.41969	0.00466
176	1239	0.0490458	2.83939	0.00466
177	1246	0.0490456	0.709847	0.0015
178	1253	0.0490453	1.41969	0.0117
179	1260	0.0490453	2.83939	0.0117
180	1267	0.0490451	0.709847	0.00185
181	1274	0.0490448	1.41969	0.00468
182	1281	0.0490448	2.83939	0.00468
183	1288	0.0490446	0.709847	0.00141
184	1295	0.0490443	1.41969	0.012
185	1302	0.0490443	2.83939	0.012
186	1309	0.0490442	0.709847	0.00176
187	1316	0.0490439	1.41969	0.00507
188	1323	0.0490439	2.83939	0.00507
189	1330	0.0490437	0.709847	0.00137
190	1337	0.0490435	1.41969	0.0115
191	1344	0.0490435	2.83939	0.0115
192	1351	0.0490433	0.709847	0.00171
193	1358	0.0490431	1.41969	0.00508
194	1365	0.0490431	2.83939	0.00508
195	1372	0.049043	0.709847	0.00132
196	1379	0.0490427	1.41969	0.0113
197	1386	0.0490427	2.83939	0.0113
198	1393	0.0490426	0.709847	0.00164
199	1400	0.0490423	1.41969	0.00472
200	1407	0.0490423	2.83939	0.00472
201	1414	0.0490422	0.709847	0.00127
202	1421	0.049042	1.41969	0.012
203	1428	0.049042	2.83939	0.012
204	1435	0.0490419	0.709847	0.00157
205	1442	0.0490417	1.41969	0.00434
206	1449	0.0490417	2.83939	0.00434
207	1456	0.0490416	0.709847	0.00138
208	1463	0.0490414	1.41969	0.0129
209	1470	0.0490414	2.83939	0.0129
210	1477	0.0490412	0.709847	0.00149
211	1484	0.0490411	1.41969	0.00414
212	1491	0.0490411	2.83939	0.00414
213	1498	0.049041	0.709847	0.00136
214	1505	0.0490408	1.41969	0.0137
215	1512	0.0490408	2.83939	0.0137
216	1519	0.0490407	0.709847	0.00142
217	1526	0.0490405	1.41969	0.00398
218	1533	0.0490405	2.83939	0.00398
219	1540	0.0490404	0.709847	0.00135

220	1547	0.0490402	1.41969	0.0141
221	1554	0.0490402	2.83939	0.0223
222	1561	0.0490391	0.709847	0.00147
223	1568	0.049039	1.41969	0.0027
224	1575	0.0490389	2.83939	0.0184
225	1582	0.0490382	0.709847	0.00145
226	1589	0.049038	1.41969	0.00241
227	1596	0.049038	2.83939	0.0172
228	1603	0.0490374	0.709847	0.00142
229	1610	0.0490373	1.41969	0.0021
230	1617	0.0490372	2.83939	0.016
231	1624	0.0490356	2.83939	0.0192
232	1631	0.0490338	5.67877	0.0799
233	1638	0.049031	5.67877	0.0853
234	1645	0.0490279	5.67877	0.0895
235	1652	0.0490246	5.67877	0.0946
236	1659	0.0490204	5.67877	0.107
237	1666	0.0490176	5.67877	0.0922
238	1673	0.0490164	5.67877	0.0899
239	1680	0.0490126	1.41969	0.0045
240	1687	0.0490126	2.83939	0.0045
241	1694	0.0490126	0.709847	0.000914
242	1701	0.0490125	1.41969	0.00467
243	1708	0.0490125	2.83939	0.00467
244	1715	0.0490124	0.709847	0.000991
245	1722	0.0490123	1.41969	0.00482
246	1729	0.0490123	2.83939	0.00482
247	1736	0.0490123	0.709847	0.00101
248	1743	0.0490122	1.41969	0.00484
249	1750	0.0490122	2.83939	0.0209
250	1757	0.049012	0.709847	0.000977
251	1764	0.0490119	1.41969	0.0047
252	1771	0.0490119	2.83939	0.0203
253	1778	0.0490117	0.709847	0.000945
254	1785	0.0490116	1.41969	0.00455
255	1792	0.0490116	2.83939	0.0197
256	1799	0.0490114	0.709847	0.000913
257	1806	0.0490114	1.41969	0.00441
258	1813	0.0490114	2.83939	0.0191
259	1820	0.0490112	0.709847	0.000883
260	1827	0.0490112	1.41969	0.00428
261	1834	0.0490111	2.83939	0.0186
262	1841	0.049011	0.709847	0.000855
263	1848	0.0490109	1.41969	0.00415
264	1855	0.0490109	2.83939	0.0181
265	1862	0.0490108	0.709847	0.000828
266	1869	0.0490107	1.41969	0.00402
267	1876	0.0490107	2.83939	0.0176
268	1883	0.0490106	0.709847	0.000803
269	1890	0.0490106	1.41969	0.00391
270	1897	0.0490105	2.83939	0.0171
271	1904	0.0490104	0.709847	0.000778
272	1911	0.0490104	1.41969	0.00379
273	1918	0.0490104	2.83939	0.0167

274	1925	0.0490103	0.709847	0.000756
275	1932	0.0490102	1.41969	0.00369
276	1939	0.0490102	2.83939	0.0163
277	1946	0.0490101	0.709847	0.000733
278	1953	0.0490101	1.41969	0.00359
279	1960	0.0490101	2.83939	0.0159
280	1967	0.04901	0.709847	0.000711
281	1974	0.0490099	1.41969	0.00349
282	1981	0.0490099	2.83939	0.0155
283	1988	0.0490098	2.83939	0.0152
284	1995	0.0490098	2.83939	0.015
285	2002	0.0490097	2.83939	0.0148
286	2009	0.0490096	2.83939	0.0146
287	2016	0.0490095	2.83939	0.0144
288	2023	0.0490095	2.83939	0.0143
289	2030	0.0490094	2.83939	0.0141
290	2037	0.0490093	2.83939	0.0139
291	2044	0.0490093	2.83939	0.0138
292	2051	0.0490092	2.83939	0.0136
293	2058	0.0490091	2.83939	0.0134
294	2065	0.0490091	2.83939	0.0133
295	2072	0.049009	2.83939	0.0131
296	2079	0.049009	2.83939	0.013
297	2086	0.0490089	2.83939	0.0129
298	2093	0.0490089	2.83939	0.0127
299	2100	0.0490088	2.83939	0.0126
300	2107	0.0490088	2.83939	0.0124
301	2114	0.0490087	2.83939	0.0123
302	2121	0.0490087	2.83939	0.0122
303	2128	0.0490086	2.83939	0.0121
304	2135	0.0490086	2.83939	0.0119
305	2142	0.0490086	2.83939	0.0118
306	2149	0.0490086	5.67877	0.0118
307	2156	0.0490085	1.41969	0.00272
308	2163	0.0490085	2.83939	0.0117
309	2170	0.0490085	2.83939	0.0115
310	2177	0.0490084	2.83939	0.0114
311	2184	0.0490084	2.83939	0.0113
312	2191	0.0490084	2.83939	0.0112
313	2198	0.0490083	2.83939	0.0111
314	2205	0.0490083	2.83939	0.011
315	2212	0.0490083	2.83939	0.0109
316	2219	0.0490082	2.83939	0.0108
317	2226	0.0490082	2.83939	0.0107
318	2233	0.0490082	2.83939	0.0106
319	2240	0.0490081	2.83939	0.0105
320	2247	0.0490081	2.83939	0.0104
321	2254	0.0490081	2.83939	0.0103
322	2261	0.0490081	2.83939	0.0102
323	2268	0.049008	2.83939	0.0101
324	2275	0.049008	2.83939	0.01
325	2282	0.049008	2.83939	0.00993
326	2289	0.049008	5.67877	0.00993
327	2296	0.049008	1.41969	0.00228

328	2303	0.0490079	2.83939	0.00983
329	2310	0.0490079	2.83939	0.00973
330	2317	0.0490079	2.83939	0.00964
331	2324	0.0490079	5.67877	0.00964
332	2331	0.0490079	1.41969	0.00221
333	2338	0.0490079	2.83939	0.00954
334	2345	0.0490078	2.83939	0.00945
335	2352	0.0490078	5.67877	0.00945
336	2359	0.0490078	1.41969	0.00217
337	2366	0.0490078	2.83939	0.00934
338	2373	0.0490078	2.83939	0.00926
339	2380	0.0490078	2.83939	0.00918
340	2387	0.0490078	5.67877	0.00918
341	2394	0.0490078	1.41969	0.0021
342	2401	0.0490078	2.83939	0.00908
343	2408	0.0490077	2.83939	0.009
344	2415	0.0490077	2.83939	0.00894
345	2422	0.0490077	2.83939	0.00885
346	2429	0.0490077	5.67877	0.00885
347	2436	0.0490077	1.41969	0.00203
348	2443	0.0490077	2.83939	0.00876
349	2450	0.0490077	5.67877	0.00876
350	2457	0.0490077	1.41969	0.002
351	2464	0.0490076	2.83939	0.00867
352	2471	0.0490076	2.83939	0.0086
353	2478	0.0490076	2.83939	0.00854
354	2485	0.0490076	2.83939	0.00847
355	2492	0.0490076	2.83939	0.00841
356	2499	0.0490076	2.83939	0.00834
357	2506	0.0490076	5.67877	0.00834
358	2513	0.0490076	1.41969	0.0019
359	2520	0.0490075	2.83939	0.00825
360	2527	0.0490075	2.83939	0.00819
361	2534	0.0490075	5.67877	0.00819
362	2541	0.0490075	1.41969	0.00187
363	2548	0.0490075	2.83939	0.0081
364	2555	0.0490075	2.83939	0.00805
365	2562	0.0490075	5.67877	0.00805
366	2569	0.0490075	1.41969	0.00183
367	2576	0.0490075	2.83939	0.00796
368	2583	0.0490075	2.83939	0.00791
369	2590	0.0490075	5.67877	0.00791
370	2597	0.0490075	1.41969	0.0018
371	2604	0.0490074	2.83939	0.00782
372	2611	0.0490074	2.83939	0.00776
373	2618	0.0490074	5.67877	0.00776
374	2625	0.0490074	1.41969	0.00176
375	2632	0.0490074	2.83939	0.00769
376	2639	0.0490074	2.83939	0.00765
377	2646	0.0490074	5.67877	0.00765
378	2653	0.0490074	1.41969	0.00173
379	2660	0.0490074	2.83939	0.00756
380	2667	0.0490074	2.83939	0.00753
381	2674	0.0490074	2.83939	0.00747

382	2681	0.0490073	2.83939	0.00742
383	2688	0.0490073	5.67877	0.00742
384	2695	0.0490073	1.41969	0.00168
385	2702	0.0490073	2.83939	0.00733
386	2709	0.0490073	2.83939	0.0073
387	2716	0.0490073	5.67877	0.0073
388	2723	0.0490073	1.41969	0.00165
389	2730	0.0490073	2.83939	0.00721
390	2737	0.0490073	5.67877	0.00721
391	2744	0.0490073	1.41969	0.00163
392	2751	0.0490073	2.83939	0.00714
393	2758	0.0490073	2.83939	0.00711
394	2765	0.0490073	5.67877	0.00711
395	2772	0.0490073	1.41969	0.0016
396	2779	0.0490073	2.83939	0.00703
397	2786	0.0490073	5.67877	0.00703
398	2793	0.0490073	1.41969	0.00159
399	2800	0.0490072	2.83939	0.00696
400	2807	0.0490072	5.67877	0.00696
401	2814	0.0490072	1.41969	0.00157
402	2821	0.0490072	2.83939	0.0069
403	2828	0.0490072	2.83939	0.00688
404	2835	0.0490072	5.67877	0.00688
405	2842	0.0490072	1.41969	0.00155
406	2849	0.0490072	2.83939	0.00679
407	2856	0.0490072	5.67877	0.00679
408	2863	0.0490072	1.41969	0.00153
409	2870	0.0490072	2.83939	0.00673
410	2877	0.0490072	5.67877	0.00673
411	2884	0.0490072	1.41969	0.00152
412	2891	0.0490072	2.83939	0.00667
413	2898	0.0490072	5.67877	0.00667
414	2905	0.0490072	1.41969	0.0015
415	2912	0.0490072	2.83939	0.00661
416	2919	0.0490072	5.67877	0.00661
417	2926	0.0490072	1.41969	0.00149
418	2933	0.0490072	2.83939	0.00654
419	2940	0.0490072	5.67877	0.00654
420	2947	0.0490072	1.41969	0.00147
421	2954	0.0490072	2.83939	0.00649
422	2961	0.0490072	5.67877	0.00649
423	2968	0.0490072	1.41969	0.00146
424	2975	0.0490071	2.83939	0.00643
425	2982	0.0490071	5.67877	0.00643
426	2989	0.0490071	1.41969	0.00145
427	2996	0.0490071	2.83939	0.00637
428	3003	0.0490071	5.67877	0.00637
429	3010	0.0490071	1.41969	0.00143
430	3017	0.0490071	2.83939	0.00632
431	3024	0.0490071	5.67877	0.00632
432	3031	0.0490071	1.41969	0.00142
433	3038	0.0490071	2.83939	0.00626
434	3045	0.0490071	2.83939	0.00627
435	3052	0.0490071	2.83939	0.00622

436	3059	0.0490071	5.67877	0.00622
437	3066	0.0490071	1.41969	0.00139
438	3073	0.0490071	2.83939	0.00614
439	3080	0.0490071	2.83939	0.00614
440	3087	0.0490071	5.67877	0.00614
441	3094	0.0490071	1.41969	0.00137
442	3101	0.0490071	2.83939	0.00605
443	3108	0.0490071	2.83939	0.00606
444	3115	0.0490071	5.67877	0.00606
445	3122	0.0490071	1.41969	0.00134
446	3129	0.0490071	2.83939	0.00597
447	3136	0.0490071	2.83939	0.00598
448	3143	0.0490071	2.83939	0.00595
449	3150	0.049007	2.83939	0.00592
450	3157	0.049007	2.83939	0.00588
451	3164	0.049007	2.83939	0.00585
452	3171	0.049007	5.67877	0.00585
453	3178	0.049007	1.41969	0.00129
454	3185	0.049007	2.83939	0.00576
455	3192	0.049007	2.83939	0.00578
456	3199	0.049007	2.83939	0.00575
457	3206	0.049007	5.67877	0.00575
458	3213	0.049007	1.41969	0.00132
459	3220	0.049007	0.354923	0.000178
460	3227	0.049007	0.709847	0.000245
461	3234	0.049007	1.41969	0.00132
462	3241	0.049007	2.83939	0.00566
463	3248	0.049007	2.83939	0.00568
464	3255	0.049007	5.67877	0.00568
465	3262	0.049007	1.41969	0.00125
466	3269	0.049007	2.83939	0.00558
467	3276	0.049007	5.67877	0.00558
468	3283	0.049007	1.41969	0.00124
469	3290	0.049007	2.83939	0.00554
470	3297	0.049007	5.67877	0.00554
471	3304	0.049007	1.41969	0.00123
472	3311	0.049007	2.83939	0.00549
473	3318	0.049007	5.67877	0.00549
474	3325	0.049007	1.41969	0.00122
475	3332	0.049007	2.83939	0.00545
476	3339	0.049007	2.83939	0.00542
477	3346	0.049007	5.67877	0.00542
478	3353	0.0490069	1.41969	0.0012
479	3360	0.0490069	2.83939	0.00539
480	3367	0.0490069	2.83939	0.00541
481	3374	0.0490069	5.67877	0.00541
482	3381	0.0490069	1.41969	0.00118
483	3388	0.0490069	2.83939	0.00532
484	3395	0.0490069	5.67877	0.022
485	3402	0.0490068	5.67877	0.0206
486	3409	0.0490068	11.3575	0.0206
487	3416	0.0490067	2.83939	0.00522
488	3423	0.0490067	5.67877	0.00522
489	3430	0.0490067	1.41969	0.00117

490	3437	0.0490067	2.83939	0.0052
491	3444	0.0490067	2.83939	0.0052
492	3451	0.0490067	5.67877	0.0214
493	3458	0.0490064	1.41969	0.00278
494	3465	0.0490064	2.83939	0.00527
495	3472	0.0490064	5.67877	0.00527
496	3479	0.0490064	1.41969	0.00124
497	3486	0.0490064	1.41969	0.00124
498	3493	0.0490064	2.83939	0.00522
499	3500	0.0490064	2.83939	0.00519
500	3507	0.0490064	5.67877	0.00519
501	3514	0.0490064	1.41969	0.00123
502	3521	0.0490064	1.41969	0.00121
503	3528	0.0490064	2.83939	0.00514
504	3535	0.0490064	5.67877	0.00514
505	3542	0.0490064	1.41969	0.00121
506	3549	0.0490064	2.83939	0.00511
507	3556	0.0490064	2.83939	0.00508
508	3563	0.0490064	5.67877	0.00508
509	3570	0.0490064	1.41969	0.0012
510	3577	0.0490064	2.83939	0.0012
511	3584	0.0490064	0.709847	0.0012
512	3591	0.0490064	0.177462	0.0012
513	3598	0.0490064	0.0443654	8.28e-05
514	3605	0.0490064	0.0110914	0.00039
515	3612	0.0490064	0.0221827	6.48e-05
516	3619	0.0490064	0.0221827	0.00061
517	3626	0.0490064	0.0443654	5.69e-05
518	3633	0.0490064	0.0887308	0.000311
519	3640	0.0490064	0.177462	4.56e-05
520	3647	0.0490064	0.354923	0.00105
521	3654	0.0490064	0.709847	0.000237
522	3661	0.0490064	1.41969	0.00115
523	3668	0.0490064	2.83939	0.00504
524	3675	0.0490064	2.83939	0.00517
525	3682	0.0490064	2.83939	0.00503
526	3689	0.0490064	5.67877	0.00503
527	3696	0.0490064	1.41969	0.0012
528	3703	0.0490064	2.83939	0.00501
529	3710	0.0490064	5.67877	0.00501
530	3717	0.0490064	1.41969	0.00501
531	3724	0.0490064	0.354923	8.02e-05
532	3731	0.0490064	0.354923	4.01e-05
533	3738	0.0490064	0.709847	0.00187
534	3745	0.0490064	1.41969	0.00118
535	3752	0.0490064	2.83939	0.00497
536	3759	0.0490064	5.67877	0.00497
537	3766	0.0490064	1.41969	0.00118
538	3773	0.0490064	2.83939	0.00494
539	3780	0.0490064	5.67877	0.00494
540	3787	0.0490064	1.41969	0.00117
541	3794	0.0490064	2.83939	0.0049
542	3801	0.0490064	5.67877	0.0049
543	3808	0.0490063	1.41969	0.00116

544	3815	0.0490063	1.41969	0.00116
545	3822	0.0490063	2.83939	0.00116
546	3829	0.0490063	0.709847	0.00116
547	3836	0.0490063	0.177462	0.00116
548	3843	0.0490063	0.0443654	5.58e-05
549	3850	0.0490063	0.0110914	0.000185
550	3857	0.0490063	0.0221827	0.000185
551	3864	0.0490063	0.00554568	0.000185
552	3871	0.0490063	0.00138642	4.26e-05
553	3878	0.0490063	0.00138642	0.000852
554	3885	0.0490063	0.00277284	5.37e-05
555	3892	0.0490063	0.00554568	5.37e-05
556	3899	0.0490063	0.00138642	0.000216
557	3906	0.0490063	0.00138642	4.41e-05
558	3913	0.0490063	0.00277284	0.000647
559	3920	0.0490063	0.00554568	5.25e-05
560	3927	0.0490063	0.0110914	5.25e-05
561	3934	0.0490063	0.00277284	0.000241
562	3941	0.0490063	0.00277284	4.5e-05
563	3948	0.0490063	0.00069321	0.000542
564	3955	0.0490063	0.00138642	5.16e-05
565	3962	0.0490063	0.00277284	0.00026
566	3969	0.0490063	0.00554568	4.58e-05
567	3976	0.0490063	0.0110914	0.000492
568	3983	0.0490063	0.0221827	5.1e-05
569	3990	0.0490063	0.0221827	0.000267
570	3997	0.0490063	0.0443654	4.61e-05
571	4004	0.0490063	0.0887308	4.61e-05
572	4011	0.0490063	0.0221827	4.61e-05
573	4018	0.0490063	0.00554568	0.000464
574	4025	0.0490063	0.00554568	5.03e-05
575	4032	0.0490063	0.0110914	5.03e-05
576	4039	0.0490063	0.00277284	0.000297
577	4046	0.0490063	0.00277284	4.7e-05
578	4053	0.0490063	0.00277284	0.000408
579	4060	0.0490063	0.00554568	4.94e-05
580	4067	0.0490063	0.0110914	0.000312
581	4074	0.0490063	0.0221827	0.000312
582	4081	0.0490063	0.00554568	0.000312
583	4088	0.0490063	0.00138642	4.74e-05
584	4095	0.0490063	0.00138642	0.000399
585	4102	0.0490063	0.00277284	4.92e-05
586	4109	0.0490063	0.00277284	0.000323
587	4116	0.0490063	0.00554568	4.74e-05
588	4123	0.0490063	0.0110914	0.000369
589	4130	0.0490063	0.0221827	4.9e-05
590	4137	0.0490063	0.0443654	0.000331
591	4144	0.0490063	0.0887308	4.64e-05
592	4151	0.0490063	0.177462	0.00043
593	4158	0.0490063	0.354923	6.82e-05
594	4165	0.0490063	0.709847	6.82e-05
595	4172	0.0490063	0.177462	6.82e-05
596	4179	0.0490063	0.0443654	6.82e-05
597	4186	0.0490063	0.0110914	6.82e-05

598	4193	0.0490063	0.00277284	8.31e-05
599	4200	0.0490063	0.00069321	5.1e-05
600	4207	0.0490063	0.00138642	0.000251
601	4214	0.0490063	0.00277284	4.59e-05
602	4221	0.0490063	0.00554568	0.000482
603	4228	0.0490063	0.0110914	5.04e-05
604	4235	0.0490063	0.0221827	0.000269
605	4242	0.0490063	0.0443654	4.57e-05
606	4249	0.0490063	0.0887308	4.57e-05
607	4256	0.0490063	0.0221827	4.57e-05
608	4263	0.0490063	0.00554568	0.000461
609	4270	0.0490063	0.00554568	4.99e-05
610	4277	0.0490063	0.0110914	0.000276
611	4284	0.0490063	0.0221827	4.61e-05
612	4291	0.0490063	0.0443654	4.61e-05
613	4298	0.0490063	0.0110914	4.61e-05
614	4305	0.0490063	0.00277284	0.000429
615	4312	0.0490063	0.00277284	4.95e-05
616	4319	0.0490063	0.00277284	0.000299
617	4326	0.0490063	0.00554568	4.68e-05
618	4333	0.0490063	0.0110914	0.000389
619	4340	0.0490063	0.0221827	4.86e-05
620	4347	0.0490063	0.0443654	4.86e-05
621	4354	0.0490063	0.0110914	4.86e-05
622	4361	0.0490063	0.00277284	0.000309
623	4368	0.0490063	0.00277284	4.61e-05
624	4375	0.0490063	0.00554568	0.000392
625	4382	0.0490063	0.0110914	4.88e-05
626	4389	0.0490063	0.0221827	0.000307
627	4396	0.0490063	0.0443654	4.66e-05
628	4403	0.0490063	0.0887308	0.000397
629	4410	0.0490063	0.177462	5.3e-05
630	4417	0.0490063	0.354923	5.3e-05
631	4424	0.0490063	0.0887308	5.3e-05
632	4431	0.0490063	0.0221827	5.3e-05
633	4438	0.0490063	0.00554568	5.3e-05
634	4445	0.0490063	0.00138642	0.00019
635	4452	0.0490063	0.00138642	4.2e-05
636	4459	0.0490063	0.00277284	0.000693
637	4466	0.0490063	0.00554568	5.16e-05
638	4473	0.0490063	0.0110914	0.00022
639	4480	0.0490063	0.0221827	4.35e-05
640	4487	0.0490063	0.0443654	0.000562
641	4494	0.0490063	0.0887308	5.12e-05
642	4501	0.0490063	0.0887308	0.000222
643	4508	0.0490063	0.177462	3.86e-05
644	4515	0.0490063	0.354923	3.86e-05
645	4522	0.0490063	0.0887308	3.86e-05
646	4529	0.0490063	0.0221827	0.00128
647	4536	0.0490063	0.0221827	5.3e-05
648	4543	0.0490063	0.0443654	0.000172
649	4550	0.0490063	0.0443654	4.03e-05
650	4557	0.0490063	0.0443654	0.000851
651	4564	0.0490063	0.0887308	5.29e-05

652	4571	0.0490063	0.177462	0.000161
653	4578	0.0490063	0.354923	4.9e-05
654	4585	0.0490063	0.709847	6.53e-05
655	4592	0.0490063	1.41969	6.53e-05
656	4599	0.0490063	0.354923	6.53e-05
657	4606	0.0490063	0.0887308	6.53e-05
658	4613	0.0490063	0.0221827	6.53e-05
659	4620	0.0490063	0.00554568	6.53e-05
660	4627	0.0490063	0.00138642	8.25e-05
661	4634	0.0490063	0.00138642	4.69e-05
662	4641	0.0490063	0.00138642	0.000335
663	4648	0.0490063	0.00277284	4.68e-05
664	4655	0.0490063	0.00277284	0.000329
665	4662	0.0490063	0.00554568	4.65e-05
666	4669	0.0490063	0.0110914	0.000321
667	4676	0.0490063	0.0221827	0.000321
668	4683	0.0490063	0.00554568	0.000321
669	4690	0.0490063	0.00138642	4.63e-05
670	4697	0.0490063	0.00138642	0.000349
671	4704	0.0490063	0.00277284	4.71e-05
672	4711	0.0490063	0.00554568	0.00032
673	4718	0.0490063	0.00138642	4.57e-05
674	4725	0.0490063	0.00277284	0.000351
675	4732	0.0490063	0.00554568	4.71e-05
676	4739	0.0490063	0.0110914	0.000314
677	4746	0.0490063	0.0221827	4.61e-05
678	4753	0.0490063	0.0443654	0.000355
679	4760	0.0490063	0.0887308	4.57e-05
680	4767	0.0490063	0.177462	0.000369
681	4774	0.0490063	0.354923	0.000369
682	4781	0.0490063	0.0887308	0.000369
683	4788	0.0490063	0.0221827	0.000369
684	4795	0.0490063	0.00554568	4.69e-05
685	4802	0.0490063	0.00138642	0.000297
686	4809	0.0490063	0.00138642	4.56e-05
687	4816	0.0490063	0.00277284	0.000345
688	4823	0.0490063	0.00277284	4.69e-05
689	4830	0.0490063	0.00554568	0.000312
690	4837	0.0490063	0.0110914	0.000312
691	4844	0.0490063	0.00277284	4.51e-05
692	4851	0.0490063	0.00277284	0.000354
693	4858	0.0490063	0.00554568	4.64e-05
694	4865	0.0490063	0.0110914	4.64e-05
695	4872	0.0490063	0.00277284	0.000314
696	4879	0.0490063	0.00277284	4.59e-05
697	4886	0.0490063	0.00554568	0.000337
698	4893	0.0490063	0.0110914	4.57e-05
699	4900	0.0490063	0.0221827	0.000324
700	4907	0.0490063	0.0443654	4.64e-05
701	4914	0.0490063	0.0887308	0.000329
702	4921	0.0490063	0.177462	5.06e-05
703	4928	0.0490063	0.354923	5.06e-05
704	4935	0.0490063	0.0887308	5.06e-05
705	4942	0.0490063	0.0221827	5.06e-05

706	4949	0.0490063	0.00554568	5.06e-05
707	4956	0.0490063	0.00138642	0.0002
708	4963	0.0490063	0.00138642	4.13e-05
709	4970	0.0490063	0.00277284	0.0006
710	4977	0.0490063	0.00554568	4.96e-05
711	4984	0.0490063	0.00554568	0.000221
712	4991	0.0490063	0.0110914	4.2e-05
713	4998	0.0490063	0.0221827	0.000523
714	5005	0.0490063	0.0443654	4.91e-05
715	5012	0.0490063	0.0443654	0.000228
716	5019	0.0490063	0.0887308	0.000228
717	5026	0.0490063	0.0221827	0.000228
718	5033	0.0490063	0.00554568	0.000228
719	5040	0.0490063	0.00138642	4.32e-05
720	5047	0.0490063	0.00138642	0.000472
721	5054	0.0490063	0.00277284	4.8e-05
722	5061	0.0490063	0.00554568	0.000249
723	5068	0.0490063	0.0110914	4.42e-05
724	5075	0.0490063	0.0110914	0.000405
725	5082	0.0490063	0.0221827	4.71e-05
726	5089	0.0490063	0.0443654	0.000268
727	5096	0.0490063	0.0887308	4.29e-05
728	5103	0.0490063	0.177462	0.00048
729	5110	0.0490063	0.177462	5.25e-05
730	5117	0.0490063	0.177462	0.000134
731	5124	0.0490063	0.354923	5e-05
732	5131	0.0490063	0.354923	0.000128
733	5138	0.0490063	0.709847	0.000128
734	5145	0.0490063	0.177462	0.000128
735	5152	0.0490063	0.0443654	0.000128
736	5159	0.0490063	0.0110914	0.000128
737	5166	0.0490063	0.00277284	0.000128
738	5173	0.0490063	0.00069321	3.63e-05
739	5180	0.0490063	0.00069321	0.0023
740	5187	0.0490063	0.00138642	0.00017
741	5194	0.0490063	0.00277284	0.000222
742	5201	0.0490063	0.00554568	8.66e-05
743	5208	0.0490063	0.0110914	0.000499
744	5215	0.0490063	0.0221827	4.74e-05
745	5222	0.0490063	0.0443654	0.000242
746	5229	0.0490063	0.0887308	4.14e-05
747	5236	0.0490063	0.177462	0.000526
748	5243	0.0490063	0.354923	0.000526
749	5250	0.0490063	0.0887308	0.000526
750	5257	0.0490063	0.0221827	0.000526
751	5264	0.0490063	0.00554568	4.68e-05
752	5271	0.0490063	0.00554568	4.68e-05
753	5278	0.0490063	0.00138642	0.000229
754	5285	0.0490063	0.00138642	4.16e-05
755	5292	0.0490063	0.00277284	0.000447
756	5299	0.0490063	0.00277284	4.63e-05
757	5306	0.0490063	0.00554568	0.000251
758	5313	0.0490063	0.0110914	4.23e-05
759	5320	0.0490063	0.0221827	0.000384

760	5327	0.0490063	0.0443654	4.6e-05
761	5334	0.0490063	0.0887308	0.00026
762	5341	0.0490063	0.177462	3.79e-05
763	5348	0.0490063	0.177462	0.000816
764	5355	0.0490063	0.354923	6.68e-05
765	5362	0.0490063	0.709847	7.5e-05
766	5369	0.0490063	1.41969	7.5e-05
767	5376	0.0490063	0.354923	7.5e-05
768	5383	0.0490063	0.0887308	7.5e-05
769	5390	0.0490063	0.0221827	7.5e-05
770	5397	0.0490063	0.00554568	7.5e-05
771	5404	0.0490063	0.00138642	7.5e-05
772	5411	0.0490063	0.000346605	4.52e-05
773	5418	0.0490063	0.000346605	0.000264
774	5425	0.0490063	0.00069321	4.25e-05
775	5432	0.0490063	0.00138642	0.000377
776	5439	0.0490063	0.00277284	4.53e-05
777	5446	0.0490063	0.00554568	0.000278
778	5453	0.0490063	0.0110914	4.31e-05
779	5460	0.0490063	0.0110914	0.000354
780	5467	0.0490063	0.0110914	4.48e-05
781	5474	0.0490063	0.0221827	0.000274
782	5481	0.0490063	0.0443654	4.31e-05
783	5488	0.0490063	0.0443654	0.000345
784	5495	0.0490063	0.0887308	4.32e-05
785	5502	0.0490063	0.177462	0.000335
786	5509	0.0490063	0.354923	6.24e-05
787	5516	0.0490063	0.354923	6.24e-05
788	5523	0.0490063	0.0887308	6.24e-05
789	5530	0.0490063	0.0221827	6.24e-05
790	5537	0.0490063	0.00554568	6.24e-05
791	5544	0.0490063	0.00138642	7.47e-05
792	5551	0.0490063	0.00138642	4.81e-05
793	5558	0.0490063	0.00277284	0.000189
794	5565	0.0490063	0.00554568	3.93e-05
795	5572	0.0490063	0.0110914	0.000567
796	5579	0.0490063	0.0221827	4.72e-05
797	5586	0.0490063	0.0443654	0.000206
798	5593	0.0490063	0.0887308	3.88e-05
799	5600	0.0490063	0.0887308	0.000617
800	5607	0.0490063	0.177462	5.14e-05
801	5614	0.0490063	0.354923	7.92e-05
802	5621	0.0490063	0.354923	7.92e-05
803	5628	0.0490063	0.0887308	7.92e-05
804	5635	0.0490063	0.0221827	7.92e-05
805	5642	0.0490063	0.00554568	7.92e-05
806	5649	0.0490063	0.00138642	7.92e-05
807	5656	0.0490063	0.000346605	4.11e-05
808	5663	0.0490063	0.000346605	0.000435
809	5670	0.0490063	0.00069321	4.58e-05
810	5677	0.0490063	0.00138642	0.000236
811	5684	0.0490063	0.00277284	4.15e-05
812	5691	0.0490063	0.00069321	0.000435
813	5698	0.0490063	0.00138642	4.52e-05

814	5705	0.0490063	0.00138642	0.000237
815	5712	0.0490063	0.00277284	4.21e-05
816	5719	0.0490063	0.00554568	0.000409
817	5726	0.0490063	0.0110914	4.52e-05
818	5733	0.0490063	0.0221827	4.52e-05
819	5740	0.0490063	0.00554568	4.52e-05
820	5747	0.0490063	0.00138642	0.000248
821	5754	0.0490063	0.00138642	4.14e-05
822	5761	0.0490063	0.00138642	0.000395
823	5768	0.0490063	0.00277284	4.49e-05
824	5775	0.0490063	0.00554568	0.000247
825	5782	0.0490063	0.0110914	4.1e-05
826	5789	0.0490063	0.0221827	0.000403
827	5796	0.0490063	0.0443654	4.47e-05
828	5803	0.0490063	0.0887308	0.00026
829	5810	0.0490063	0.177462	4.63e-05
830	5817	0.0490063	0.354923	0.000148
831	5824	0.0490063	0.709847	0.000154
832	5831	0.0490063	1.41969	0.0011
833	5838	0.0490063	2.83939	0.00478
834	5845	0.0490063	2.83939	0.00476
835	5852	0.0490063	2.83939	0.00474
836	5859	0.0490063	2.83939	0.00474
837	5866	0.0490063	0.709847	0.000263
838	5873	0.0490063	0.177462	0.000263
839	5880	0.0490063	0.0443654	0.000263
840	5887	0.0490063	0.0110914	0.000263
841	5894	0.0490063	0.00277284	4.24e-05
842	5901	0.0490063	0.00069321	0.000414
843	5908	0.0490063	0.00138642	4.57e-05
844	5915	0.0490063	0.00277284	0.000241
845	5922	0.0490063	0.00554568	4.13e-05
846	5929	0.0490063	0.0110914	0.000396
847	5936	0.0490063	0.0221827	4.49e-05
848	5943	0.0490063	0.0221827	0.000246
849	5950	0.0490063	0.0443654	4.21e-05
850	5957	0.0490063	0.0443654	0.000358
851	5964	0.0490063	0.0887308	4.35e-05
852	5971	0.0490063	0.0887308	0.000303
853	5978	0.0490063	0.177462	4.71e-05
854	5985	0.0490063	0.354923	0.000118
855	5992	0.0490063	0.709847	0.000159
856	5999	0.0490063	0.709847	0.000189
857	6006	0.0490063	1.41969	0.00108
858	6013	0.0490063	2.83939	0.00108
859	6020	0.0490063	0.709847	0.00108
860	6027	0.0490063	0.177462	0.00108
861	6034	0.0490063	0.0443654	0.00108
862	6041	0.0490063	0.0110914	4.9e-05
863	6048	0.0490063	0.0110914	0.000153
864	6055	0.0490063	0.0110914	3.72e-05
865	6062	0.0490063	0.0221827	0.000811
866	6069	0.0490063	0.0443654	7.05e-05
867	6076	0.0490063	0.0887308	0.000186

868	6083	0.0490063	0.177462	4.06e-05
869	6090	0.0490063	0.354923	0.00173
870	6097	0.0490063	0.709847	0.00173
871	6104	0.0490063	0.177462	0.00173
872	6111	0.0490063	0.0443654	6.65e-05
873	6118	0.0490063	0.0443654	6.65e-05
874	6125	0.0490063	0.0110914	6.65e-05
875	6132	0.0490063	0.00277284	0.000268
876	6139	0.0490063	0.00277284	5.6e-05
877	6146	0.0490063	0.00554568	0.000605
878	6153	0.0490063	0.00554568	4.73e-05
879	6160	0.0490063	0.0110914	4.73e-05
880	6167	0.0490063	0.00277284	0.000228
881	6174	0.0490063	0.00277284	4.06e-05
882	6181	0.0490063	0.00554568	0.000459
883	6188	0.0490063	0.0110914	4.55e-05
884	6195	0.0490063	0.0221827	0.000227
885	6202	0.0490063	0.0443654	3.97e-05
886	6209	0.0490063	0.0887308	0.000431
887	6216	0.0490063	0.0887308	4.52e-05
888	6223	0.0490063	0.177462	0.000188
889	6230	0.0490063	0.354923	0.000188
890	6237	0.0490063	0.0887308	0.000188
891	6244	0.0490063	0.0221827	0.000188
892	6251	0.0490063	0.00554568	0.000188
893	6258	0.0490063	0.00138642	3.86e-05
894	6265	0.0490063	0.00138642	0.000546
895	6272	0.0490063	0.00277284	4.53e-05
896	6279	0.0490063	0.00277284	0.000197
897	6286	0.0490063	0.00554568	3.88e-05
898	6293	0.0490063	0.0110914	0.000481
899	6300	0.0490063	0.0221827	4.49e-05
900	6307	0.0490063	0.0443654	4.49e-05
901	6314	0.0490063	0.0110914	4.49e-05
902	6321	0.0490063	0.00277284	0.000206
903	6328	0.0490063	0.00277284	3.92e-05
904	6335	0.0490063	0.00554568	0.000467
905	6342	0.0490063	0.0110914	4.44e-05
906	6349	0.0490063	0.0221827	0.000221
907	6356	0.0490063	0.0443654	3.93e-05
908	6363	0.0490063	0.0887308	0.00043
909	6370	0.0490063	0.177462	0.00043
910	6377	0.0490063	0.0443654	0.00043
911	6384	0.0490063	0.0110914	0.00043
912	6391	0.0490063	0.00277284	4.43e-05
913	6398	0.0490063	0.00277284	0.000223
914	6405	0.0490063	0.00554568	4.05e-05
915	6412	0.0490063	0.0110914	0.000385
916	6419	0.0490063	0.0221827	4.35e-05
917	6426	0.0490063	0.0443654	0.000252
918	6433	0.0490063	0.0443654	0.000252
919	6440	0.0490063	0.0110914	0.000252
920	6447	0.0490063	0.00277284	3.99e-05
921	6454	0.0490063	0.00069321	0.000348

922	6461	0.0490063	0.00138642	4.28e-05
923	6468	0.0490063	0.00277284	0.000262
924	6475	0.0490063	0.00554568	0.000262
925	6482	0.0490063	0.00138642	4.08e-05
926	6489	0.0490063	0.00138642	0.000338
927	6496	0.0490063	0.00277284	4.22e-05
928	6503	0.0490063	0.00277284	0.000268
929	6510	0.0490063	0.00554568	4.1e-05
930	6517	0.0490063	0.0110914	4.1e-05
931	6524	0.0490063	0.00277284	0.000317
932	6531	0.0490063	0.00277284	4.22e-05
933	6538	0.0490063	0.00554568	0.000283
934	6545	0.0490063	0.00554568	0.000283
935	6552	0.0490063	0.00138642	4.11e-05
936	6559	0.0490063	0.00138642	0.000301
937	6566	0.0490063	0.00277284	4.18e-05
938	6573	0.0490063	0.00277284	0.000273
939	6580	0.0490063	0.00554568	4.15e-05
940	6587	0.0490063	0.0110914	0.000304
941	6594	0.0490063	0.0221827	4.21e-05
942	6601	0.0490063	0.0443654	4.21e-05
943	6608	0.0490063	0.0110914	4.21e-05
944	6615	0.0490063	0.00277284	0.00029
945	6622	0.0490063	0.00277284	4.14e-05
946	6629	0.0490063	0.00277284	0.00029
947	6636	0.0490063	0.00554568	4.08e-05
948	6643	0.0490063	0.0110914	0.000308
949	6650	0.0490063	0.0221827	4.18e-05
950	6657	0.0490063	0.0443654	0.000282
951	6664	0.0490063	0.0887308	4.18e-05
952	6671	0.0490063	0.177462	0.000256
953	6678	0.0490063	0.354923	3.95e-05
954	6685	0.0490063	0.709847	0.000114
955	6692	0.0490063	1.41969	0.00105
956	6699	0.0490063	2.83939	0.00468
957	6706	0.0490063	5.67877	0.00468
958	6713	0.0490063	1.41969	0.00468
959	6720	0.0490063	0.354923	6.99e-05
960	6727	0.0490063	0.354923	3.43e-05
961	6734	0.0490063	0.354923	0.00108
962	6741	0.0490063	0.709847	0.000161
963	6748	0.0490063	0.709847	0.000161
964	6755	0.0490063	0.177462	0.000161
965	6762	0.0490063	0.0443654	0.000161
966	6769	0.0490063	0.0110914	0.000161
967	6776	0.0490063	0.00277284	0.000161
968	6783	0.0490063	0.00069321	0.000151
969	6790	0.0490063	0.00069321	0.000262
970	6797	0.0490063	0.00138642	5.22e-05
971	6804	0.0490063	0.00277284	0.000611
972	6811	0.0490063	0.00554568	4.56e-05
973	6818	0.0490063	0.00554568	0.000212
974	6825	0.0490063	0.0110914	3.92e-05
975	6832	0.0490063	0.0221827	0.000467

976	6839	0.0490063	0.0443654	4.33e-05
977	6846	0.0490063	0.0887308	4.33e-05
978	6853	0.0490063	0.0221827	4.33e-05
979	6860	0.0490063	0.00554568	4.33e-05
980	6867	0.0490063	0.00138642	0.000218
981	6874	0.0490063	0.00138642	3.88e-05
982	6881	0.0490063	0.00277284	0.000378
983	6888	0.0490063	0.00554568	4.24e-05
984	6895	0.0490063	0.0110914	0.000238
985	6902	0.0490063	0.0221827	3.96e-05
986	6909	0.0490063	0.0443654	0.000345
987	6916	0.0490063	0.0887308	4.06e-05
988	6923	0.0490063	0.177462	0.000316
989	6930	0.0490063	0.354923	5.85e-05
990	6937	0.0490063	0.709847	6.55e-05
991	6944	0.0490063	1.41969	6.55e-05
992	6951	0.0490063	0.354923	6.55e-05
993	6958	0.0490063	0.0887308	6.55e-05
994	6965	0.0490063	0.0221827	6.55e-05
995	6972	0.0490063	0.00554568	6.55e-05
996	6979	0.0490063	0.00138642	4.97e-05
997	6986	0.0490063	0.000346605	0.000101
998	6993	0.0490063	0.00069321	3.11e-05
999	7000	0.0490063	0.00138642	0.00477
1000	7007	0.0490063	0.00277284	0.0022
1001	7014	0.0490063	0.00554568	0.00224
1002	7021	0.0490063	0.0110914	0.00089
1003	7028	0.0490063	0.0221827	0.000169
1004	7035	0.0490063	0.0221827	2.86e-05
1005	7042	0.0490063	0.0443654	0.00036
1006	7049	0.0490063	0.0887308	3.25e-05
1007	7056	0.0490063	0.177462	3.25e-05
1008	7063	0.0490063	0.0443654	3.25e-05
1009	7070	0.0490063	0.0110914	3.25e-05
1010	7077	0.0490063	0.00277284	3.25e-05
1011	7084	0.0490063	0.00069321	0.000173
1012	7091	0.0490063	0.00069321	2.83e-05
1013	7098	0.0490063	0.00138642	0.000376
1014	7105	0.0490063	0.00277284	3.18e-05
1015	7112	0.0490063	0.00554568	0.000207
1016	7119	0.0490063	0.0110914	2.95e-05
1017	7126	0.0490063	0.0221827	0.000295
1018	7133	0.0490063	0.0443654	0.000295
1019	7140	0.0490063	0.0110914	0.000295
1020	7147	0.0490063	0.00277284	3.11e-05
1021	7154	0.0490063	0.00069321	0.000219
1022	7161	0.0490063	0.00138642	3.01e-05
1023	7168	0.0490063	0.00277284	0.000277
1024	7175	0.0490063	0.00554568	3.07e-05
1025	7182	0.0490063	0.0110914	0.000231
1026	7189	0.0490063	0.0221827	3.03e-05
1027	7196	0.0490063	0.0443654	0.000253
1028	7203	0.0490063	0.0887308	0.000253
1029	7210	0.0490063	0.0221827	0.000253

1030	7217	0.0490063	0.00554568	0.000253
1031	7224	0.0490063	0.00138642	2.98e-05
1032	7231	0.0490063	0.00138642	0.000262
1033	7238	0.0490063	0.00277284	3.05e-05
1034	7245	0.0490063	0.00554568	0.000238
1035	7252	0.0490063	0.0110914	0.000238
1036	7259	0.0490063	0.00277284	0.000238
1037	7266	0.0490063	0.00069321	2.98e-05
1038	7273	0.0490063	0.00069321	0.000251
1039	7280	0.0490063	0.00138642	3.03e-05
1040	7287	0.0490063	0.00277284	0.000245
1041	7294	0.0490063	0.00554568	2.99e-05
1042	7301	0.0490063	0.0110914	0.000255
1043	7308	0.0490063	0.0221827	3.02e-05
1044	7315	0.0490063	0.0443654	0.000241
1045	7322	0.0490063	0.0887308	3.05e-05
1046	7329	0.0490063	0.0887308	0.000235
1047	7336	0.0490063	0.177462	2.61e-05
1048	7343	0.0490063	0.354923	2.61e-05
1049	7350	0.0490063	0.0887308	2.61e-05
1050	7357	0.0490063	0.0221827	2.61e-05
1051	7364	0.0490063	0.00554568	0.000641
1052	7371	0.0490063	0.00554568	3.34e-05
1053	7378	0.0490063	0.0110914	0.000152
1054	7385	0.0490063	0.0221827	2.77e-05
1055	7392	0.0490063	0.0443654	0.000432
1056	7399	0.0490063	0.0443654	0.000432
1057	7406	0.0490063	0.0110914	0.000432
1058	7413	0.0490063	0.00277284	3.2e-05
1059	7420	0.0490063	0.00277284	3.2e-05
1060	7427	0.0490063	0.00069321	0.000174
1061	7434	0.0490063	0.00069321	2.84e-05
1062	7441	0.0490063	0.00069321	0.000365
1063	7448	0.0490063	0.00138642	3.15e-05
1064	7455	0.0490063	0.00277284	0.000194
1065	7462	0.0490063	0.00554568	2.86e-05
1066	7469	0.0490063	0.0110914	0.000334
1067	7476	0.0490063	0.0110914	0.000334
1068	7483	0.0490063	0.00277284	3.12e-05
1069	7490	0.0490063	0.00277284	0.0002
1070	7497	0.0490063	0.00554568	2.91e-05
1071	7504	0.0490063	0.0110914	2.91e-05
1072	7511	0.0490063	0.00277284	0.000326
1073	7518	0.0490063	0.00277284	3.09e-05
1074	7525	0.0490063	0.00277284	0.0002
1075	7532	0.0490063	0.00554568	2.91e-05
1076	7539	0.0490063	0.0110914	0.000316
1077	7546	0.0490063	0.0221827	3.15e-05
1078	7553	0.0490063	0.0443654	3.15e-05
1079	7560	0.0490063	0.0110914	3.15e-05
1080	7567	0.0490063	0.00277284	0.000199
1081	7574	0.0490063	0.00069321	2.9e-05
1082	7581	0.0490063	0.00069321	0.000319
1083	7588	0.0490063	0.00138642	3.08e-05

1084	7595	0.0490063	0.00277284	0.000212
1085	7602	0.0490063	0.00554568	2.88e-05
1086	7609	0.0490063	0.0110914	0.000293
1087	7616	0.0490063	0.0221827	0.000293
1088	7623	0.0490063	0.00554568	0.000293
1089	7630	0.0490063	0.00138642	3.03e-05
1090	7637	0.0490063	0.00138642	0.00022
1091	7644	0.0490063	0.00277284	2.93e-05
1092	7651	0.0490063	0.00554568	2.93e-05
1093	7658	0.0490063	0.00138642	0.000289
1094	7665	0.0490063	0.00138642	3.02e-05
1095	7672	0.0490063	0.00277284	0.00024
1096	7679	0.0490063	0.00554568	3e-05
1097	7686	0.0490063	0.0110914	0.000247
1098	7693	0.0490063	0.0221827	2.93e-05
1099	7700	0.0490063	0.0443654	0.000274
1100	7707	0.0490063	0.0887308	2.97e-05
1101	7714	0.0490063	0.177462	0.000273
1102	7721	0.0490063	0.354923	4.84e-05
1103	7728	0.0490063	0.354923	2.3e-05
1104	7735	0.0490063	0.709847	0.00182
1105	7742	0.0490063	1.41969	0.00106
1106	7749	0.0490063	2.83939	0.00106
1107	7756	0.0490063	0.709847	0.00106
1108	7763	0.0490063	0.177462	0.00106
1109	7770	0.0490063	0.0443654	0.00106
1110	7777	0.0490063	0.0110914	0.000359
1111	7784	0.0490063	0.0110914	0.000214
1112	7791	0.0490063	0.0221827	0.000214
1113	7798	0.0490063	0.00554568	0.000214
1114	7805	0.0490063	0.00138642	2.89e-05
1115	7812	0.0490063	0.00138642	0.000282
1116	7819	0.0490063	0.00277284	2.96e-05
1117	7826	0.0490063	0.00554568	0.000223
1118	7833	0.0490063	0.0110914	2.88e-05
1119	7840	0.0490063	0.0221827	0.000278
1120	7847	0.0490063	0.0221827	2.98e-05
1121	7854	0.0490063	0.0443654	0.000223
1122	7861	0.0490063	0.0887308	0.000223
1123	7868	0.0490063	0.0221827	0.000223
1124	7875	0.0490063	0.00554568	0.000223
1125	7882	0.0490063	0.00138642	2.86e-05
1126	7889	0.0490063	0.00138642	0.000281
1127	7896	0.0490063	0.00138642	2.92e-05
1128	7903	0.0490063	0.00277284	0.000233
1129	7910	0.0490063	0.00069321	2.9e-05
1130	7917	0.0490063	0.00138642	0.000244
1131	7924	0.0490063	0.00277284	2.94e-05
1132	7931	0.0490063	0.00554568	0.000245
1133	7938	0.0490063	0.0110914	2.92e-05
1134	7945	0.0490063	0.0110914	0.000244
1135	7952	0.0490063	0.0221827	2.96e-05
1136	7959	0.0490063	0.0443654	0.000222
1137	7966	0.0490063	0.0887308	0.000222

1138	7973	0.0490063	0.0221827	0.000222
1139	7980	0.0490063	0.00554568	0.000222
1140	7987	0.0490063	0.00138642	2.88e-05
1141	7994	0.0490063	0.00138642	0.000276
1142	8001	0.0490063	0.00277284	2.93e-05
1143	8008	0.0490063	0.00554568	0.000237
1144	8015	0.0490063	0.0110914	0.000237
1145	8022	0.0490063	0.00277284	0.000237
1146	8029	0.0490063	0.00069321	2.86e-05
1147	8036	0.0490063	0.00069321	0.000267
1148	8043	0.0490063	0.00138642	2.93e-05
1149	8050	0.0490063	0.00277284	0.000239
1150	8057	0.0490063	0.00069321	2.91e-05
1151	8064	0.0490063	0.00138642	0.000265
1152	8071	0.0490063	0.00277284	2.94e-05
1153	8078	0.0490063	0.00554568	0.000244
1154	8085	0.0490063	0.00554568	2.91e-05
1155	8092	0.0490063	0.0110914	0.000256
1156	8099	0.0490063	0.0221827	2.92e-05
1157	8106	0.0490063	0.0443654	2.92e-05
1158	8113	0.0490063	0.0110914	2.92e-05
1159	8120	0.0490063	0.00277284	0.00024
1160	8127	0.0490063	0.00069321	2.89e-05
1161	8134	0.0490063	0.00138642	0.000254
1162	8141	0.0490063	0.00277284	2.93e-05
1163	8148	0.0490063	0.00069321	0.000222
1164	8155	0.0490063	0.00138642	2.9e-05
1165	8162	0.0490063	0.00277284	0.000257
1166	8169	0.0490063	0.00554568	2.91e-05
1167	8176	0.0490063	0.0110914	2.91e-05
1168	8183	0.0490063	0.00277284	0.000226
1169	8190	0.0490063	0.00069321	2.88e-05
1170	8197	0.0490063	0.00069321	0.000253
1171	8204	0.0490063	0.00138642	2.95e-05
1172	8211	0.0490063	0.00277284	0.000219
1173	8218	0.0490063	0.00554568	2.85e-05
1174	8225	0.0490063	0.0110914	2.85e-05
1175	8232	0.0490063	0.00277284	0.000275
1176	8239	0.0490063	0.00277284	2.88e-05
1177	8246	0.0490063	0.00554568	0.000242
1178	8253	0.0490063	0.0110914	2.87e-05
1179	8260	0.0490063	0.0221827	0.000277
1180	8267	0.0490063	0.0221827	2.96e-05
1181	8274	0.0490063	0.0443654	0.000209
1182	8281	0.0490063	0.0443654	2.82e-05
1183	8288	0.0490063	0.0887308	0.000308
1184	8295	0.0490063	0.177462	0.000308
1185	8302	0.0490063	0.0443654	0.000308
1186	8309	0.0490063	0.0110914	0.000308
1187	8316	0.0490063	0.00277284	3e-05
1188	8323	0.0490063	0.00277284	0.000206
1189	8330	0.0490063	0.00554568	0.000206
1190	8337	0.0490063	0.00138642	2.82e-05
1191	8344	0.0490063	0.000346605	0.000283

1192	8351	0.0490063	0.00069321	2.92e-05
1193	8358	0.0490063	0.00138642	0.000218
1194	8365	0.0490063	0.00138642	2.82e-05
1195	8372	0.0490063	0.00277284	0.000278
1196	8379	0.0490063	0.00277284	2.91e-05
1197	8386	0.0490063	0.00554568	0.000223
1198	8393	0.0490063	0.0110914	2.88e-05
1199	8400	0.0490063	0.0221827	0.000262
1200	8407	0.0490063	0.0443654	2.89e-05
1201	8414	0.0490063	0.0887308	0.000217
1202	8421	0.0490063	0.177462	2.43e-05
1203	8428	0.0490063	0.354923	2.43e-05
1204	8435	0.0490063	0.0887308	2.43e-05
1205	8442	0.0490063	0.0221827	0.000837
1206	8449	0.0490063	0.00554568	4.28e-05
1207	8456	0.0490063	0.0110914	0.000162
1208	8463	0.0490063	0.0221827	2.68e-05
1209	8470	0.0490063	0.0443654	0.000427
1210	8477	0.0490063	0.0887308	3.15e-05
1211	8484	0.0490063	0.177462	0.000132
1212	8491	0.0490063	0.354923	3.51e-05
1213	8498	0.0490063	0.709847	4.68e-05
1214	8505	0.0490063	0.709847	4.68e-05
1215	8512	0.0490063	0.177462	4.68e-05
1216	8519	0.0490063	0.0443654	4.68e-05
1217	8526	0.0490063	0.0110914	4.68e-05
1218	8533	0.0490063	0.00277284	4.68e-05
1219	8540	0.0490063	0.00069321	3.83e-05
1220	8547	0.0490063	0.000173302	7.15e-05
1221	8554	0.0490063	0.000346605	2.22e-05
1222	8561	0.0490063	0.000346605	0.00209
1223	8568	0.0490063	0.00069321	0.000452
1224	8575	0.0490063	0.00138642	0.000253
1225	8582	0.0490063	0.00277284	2.82e-05
1226	8589	0.0490063	0.00069321	0.00024
1227	8596	0.0490063	0.00069321	2.79e-05
1228	8603	0.0490063	0.00138642	0.000246
1229	8610	0.0490063	0.00277284	2.81e-05
1230	8617	0.0490063	0.00554568	0.000252
1231	8624	0.0490063	0.0110914	2.8e-05
1232	8631	0.0490063	0.0221827	0.00023
1233	8638	0.0490063	0.0221827	2.77e-05
1234	8645	0.0490063	0.0443654	0.000264
1235	8652	0.0490063	0.0887308	2.92e-05
1236	8659	0.0490063	0.177462	0.000193
1237	8666	0.0490063	0.177462	2.32e-05
1238	8673	0.0490063	0.354923	2.32e-05
1239	8680	0.0490063	0.0887308	2.32e-05
1240	8687	0.0490063	0.0221827	0.000916
1241	8694	0.0490063	0.0221827	5.93e-05
1242	8701	0.0490063	0.0443654	0.000148
1243	8708	0.0490063	0.0443654	0.000148
1244	8715	0.0490063	0.0110914	0.000148
1245	8722	0.0490063	0.00277284	0.000148

1246	8729	0.0490063	0.00069321	3.5e-05
1247	8736	0.0490063	0.00069321	0.000426
1248	8743	0.0490063	0.00138642	3.01e-05
1249	8750	0.0490063	0.00277284	3.01e-05
1250	8757	0.0490063	0.00069321	0.000179
1251	8764	0.0490063	0.00069321	2.65e-05
1252	8771	0.0490063	0.00069321	0.000329
1253	8778	0.0490063	0.00138642	2.92e-05
1254	8785	0.0490063	0.00277284	0.000191
1255	8792	0.0490063	0.00554568	2.71e-05
1256	8799	0.0490063	0.00554568	0.000307
1257	8806	0.0490063	0.0110914	2.91e-05
1258	8813	0.0490063	0.0221827	0.000208
1259	8820	0.0490063	0.0443654	2.75e-05
1260	8827	0.0490063	0.0887308	0.000277
1261	8834	0.0490063	0.177462	3.23e-05
1262	8841	0.0490063	0.354923	5.44e-05
1263	8848	0.0490063	0.709847	5.44e-05
1264	8855	0.0490063	0.177462	5.44e-05
1265	8862	0.0490063	0.0443654	5.44e-05
1266	8869	0.0490063	0.0110914	5.44e-05
1267	8876	0.0490063	0.00277284	5.44e-05
1268	8883	0.0490063	0.00069321	5.44e-05
1269	8890	0.0490063	0.000173302	2.44e-05
1270	8897	0.0490063	0.000173302	0.000526
1271	8904	0.0490063	0.000346605	3.01e-05
1272	8911	0.0490063	0.00069321	0.000163
1273	8918	0.0490063	0.00138642	2.62e-05
1274	8925	0.0490063	0.00277284	0.000345
1275	8932	0.0490063	0.00554568	0.000345
1276	8939	0.0490063	0.00138642	2.97e-05
1277	8946	0.0490063	0.00138642	0.000189
1278	8953	0.0490063	0.00277284	2.71e-05
1279	8960	0.0490063	0.00554568	2.71e-05
1280	8967	0.0490063	0.00138642	0.000295
1281	8974	0.0490063	0.00138642	2.88e-05
1282	8981	0.0490063	0.00277284	0.000204
1283	8988	0.0490063	0.00069321	2.67e-05
1284	8995	0.0490063	0.00138642	0.000289
1285	9002	0.0490063	0.00277284	2.85e-05
1286	9009	0.0490063	0.00554568	2.85e-05
1287	9016	0.0490063	0.00138642	0.000224
1288	9023	0.0490063	0.00138642	2.73e-05
1289	9030	0.0490063	0.00277284	0.000269
1290	9037	0.0490063	0.00277284	2.83e-05
1291	9044	0.0490063	0.00554568	2.83e-05
1292	9051	0.0490063	0.00138642	0.000224
1293	9058	0.0490063	0.00138642	2.75e-05
1294	9065	0.0490063	0.00277284	0.000257
1295	9072	0.0490063	0.00554568	2.8e-05
1296	9079	0.0490063	0.0110914	0.000229
1297	9086	0.0490063	0.0221827	0.000229
1298	9093	0.0490063	0.00554568	0.000229
1299	9100	0.0490063	0.00138642	2.8e-05

1300	9107	0.0490063	0.00138642	0.000259
1301	9114	0.0490063	0.00277284	2.8e-05
1302	9121	0.0490063	0.00277284	0.000239
1303	9128	0.0490063	0.00554568	2.74e-05
1304	9135	0.0490063	0.0110914	2.74e-05
1305	9142	0.0490063	0.00277284	0.000253
1306	9149	0.0490063	0.00069321	2.83e-05
1307	9156	0.0490063	0.00138642	0.000234
1308	9163	0.0490063	0.00277284	2.78e-05
1309	9170	0.0490063	0.00554568	0.000238
1310	9177	0.0490063	0.0110914	0.000238
1311	9184	0.0490063	0.00277284	0.000238
1312	9191	0.0490063	0.00069321	2.82e-05
1313	9198	0.0490063	0.00069321	0.000228
1314	9205	0.0490063	0.00138642	2.73e-05
1315	9212	0.0490063	0.00277284	0.000271
1316	9219	0.0490063	0.00277284	2.81e-05
1317	9226	0.0490063	0.00554568	0.00023
1318	9233	0.0490063	0.0110914	2.75e-05
1319	9240	0.0490063	0.0221827	0.000241
1320	9247	0.0490063	0.0443654	0.000241
1321	9254	0.0490063	0.0110914	0.000241
1322	9261	0.0490063	0.00277284	2.77e-05
1323	9268	0.0490063	0.00069321	0.000244
1324	9275	0.0490063	0.00138642	2.76e-05
1325	9282	0.0490063	0.00277284	0.000238
1326	9289	0.0490063	0.00554568	2.76e-05
1327	9296	0.0490063	0.0110914	0.000237
1328	9303	0.0490063	0.0221827	2.75e-05
1329	9310	0.0490063	0.0221827	0.000243
1330	9317	0.0490063	0.0443654	2.78e-05
1331	9324	0.0490063	0.0887308	0.000251
1332	9331	0.0490063	0.0887308	0.000251
1333	9338	0.0490063	0.0221827	0.000251
1334	9345	0.0490063	0.00554568	0.000251
1335	9352	0.0490063	0.00138642	2.8e-05
1336	9359	0.0490063	0.00138642	0.00023
1337	9366	0.0490063	0.00277284	2.75e-05
1338	9373	0.0490063	0.00554568	2.75e-05
1339	9380	0.0490063	0.00138642	0.000251
1340	9387	0.0490063	0.00138642	2.82e-05
1341	9394	0.0490063	0.00138642	0.000222
1342	9401	0.0490063	0.00277284	2.74e-05
1343	9408	0.0490063	0.00554568	0.000255
1344	9415	0.0490063	0.00554568	2.75e-05
1345	9422	0.0490063	0.0110914	0.000247
1346	9429	0.0490063	0.0221827	2.76e-05
1347	9436	0.0490063	0.0443654	0.000241
1348	9443	0.0490063	0.0887308	2.85e-05
1349	9450	0.0490063	0.177462	0.000193
1350	9457	0.0490063	0.354923	0.000193
1351	9464	0.0490063	0.0887308	0.000193
1352	9471	0.0490063	0.0221827	0.000193
1353	9478	0.0490063	0.00554568	0.000193

1354	9485	0.0490063	0.00138642	2.63e-05
1355	9492	0.0490063	0.00138642	0.000301
1356	9499	0.0490063	0.00277284	2.86e-05
1357	9506	0.0490063	0.00554568	2.86e-05
1358	9513	0.0490063	0.00138642	0.000204
1359	9520	0.0490063	0.00138642	2.71e-05
1360	9527	0.0490063	0.00277284	0.000283
1361	9534	0.0490063	0.00554568	2.89e-05
1362	9541	0.0490063	0.0110914	2.89e-05
1363	9548	0.0490063	0.00277284	0.000203
1364	9555	0.0490063	0.00069321	2.66e-05
1365	9562	0.0490063	0.00138642	0.00031
1366	9569	0.0490063	0.00277284	2.88e-05
1367	9576	0.0490063	0.00554568	0.000203
1368	9583	0.0490063	0.0110914	0.000203
1369	9590	0.0490063	0.00277284	0.000203
1370	9597	0.0490063	0.00069321	2.67e-05
1371	9604	0.0490063	0.00069321	0.000284
1372	9611	0.0490063	0.00138642	2.8e-05
1373	9618	0.0490063	0.00138642	0.000217
1374	9625	0.0490063	0.00277284	0.000217
1375	9632	0.0490063	0.00069321	2.73e-05
1376	9639	0.0490063	0.00069321	0.000268
1377	9646	0.0490063	0.00138642	2.77e-05
1378	9653	0.0490063	0.00277284	0.00023
1379	9660	0.0490063	0.00069321	2.74e-05
1380	9667	0.0490063	0.00138642	0.000246
1381	9674	0.0490063	0.00277284	2.8e-05
1382	9681	0.0490063	0.00554568	0.000227
1383	9688	0.0490063	0.00554568	2.67e-05
1384	9695	0.0490063	0.0110914	0.000296
1385	9702	0.0490063	0.0221827	2.82e-05
1386	9709	0.0490063	0.0443654	0.000224
1387	9716	0.0490063	0.0887308	2.65e-05
1388	9723	0.0490063	0.177462	2.65e-05
1389	9730	0.0490063	0.0443654	2.65e-05
1390	9737	0.0490063	0.0110914	2.65e-05
1391	9744	0.0490063	0.00277284	0.000311
1392	9751	0.0490063	0.00277284	2.85e-05
1393	9758	0.0490063	0.00554568	2.85e-05
1394	9765	0.0490063	0.00138642	0.000202
1395	9772	0.0490063	0.00138642	2.7e-05
1396	9779	0.0490063	0.00277284	0.000282
1397	9786	0.0490063	0.00554568	2.83e-05
1398	9793	0.0490063	0.0110914	0.000215
1399	9800	0.0490063	0.0221827	2.68e-05
1400	9807	0.0490063	0.0221827	0.000275
1401	9814	0.0490063	0.0443654	2.82e-05
1402	9821	0.0490063	0.0887308	0.0002
1403	9828	0.0490063	0.0887308	2.54e-05
1404	9835	0.0490063	0.177462	2.54e-05
1405	9842	0.0490063	0.0443654	2.54e-05
1406	9849	0.0490063	0.0110914	2.54e-05
1407	9856	0.0490063	0.00277284	0.000371

1408	9863	0.0490063	0.00277284	2.91e-05
1409	9870	0.0490063	0.00554568	2.91e-05
1410	9877	0.0490063	0.00138642	0.000177
1411	9884	0.0490063	0.00138642	2.57e-05
1412	9891	0.0490063	0.00277284	0.000363
1413	9898	0.0490063	0.00554568	2.86e-05
1414	9905	0.0490063	0.0110914	2.86e-05
1415	9912	0.0490063	0.00277284	2.86e-05
1416	9919	0.0490063	0.00069321	0.000187
1417	9926	0.0490063	0.00069321	2.57e-05
1418	9933	0.0490063	0.00138642	0.000302
1419	9940	0.0490063	0.00138642	2.8e-05
1420	9947	0.0490063	0.00277284	0.000196
1421	9954	0.0490063	0.00554568	2.67e-05
1422	9961	0.0490063	0.0110914	2.67e-05
1423	9968	0.0490063	0.00277284	0.000275
1424	9975	0.0490063	0.00277284	2.74e-05
1425	9982	0.0490063	0.00069321	0.000215
1426	9989	0.0490063	0.00138642	2.71e-05
1427	9996	0.0490063	0.00277284	0.000263
1428	10003	0.0490063	0.00554568	2.76e-05
1429	10010	0.0490063	0.0110914	2.76e-05
1430	10017	0.0490063	0.00277284	0.00022
1431	10024	0.0490063	0.00069321	2.73e-05
1432	10031	0.0490063	0.00138642	0.000258
1433	10038	0.0490063	0.00277284	2.81e-05
1434	10045	0.0490063	0.00554568	0.000216
1435	10052	0.0490063	0.0110914	2.72e-05
1436	10059	0.0490063	0.0221827	2.72e-05
1437	10066	0.0490063	0.00554568	2.72e-05
1438	10073	0.0490063	0.00138642	0.000267
1439	10080	0.0490063	0.00138642	2.77e-05
1440	10087	0.0490063	0.00277284	0.000229
1441	10094	0.0490063	0.00554568	2.73e-05
1442	10101	0.0490063	0.00554568	0.00025
1443	10108	0.0490063	0.00554568	2.77e-05
1444	10115	0.0490063	0.0110914	0.000227
1445	10122	0.0490063	0.0221827	2.71e-05
1446	10129	0.0490063	0.0443654	0.000256
1447	10136	0.0490063	0.0887308	2.79e-05
1448	10143	0.0490063	0.177462	2.79e-05
1449	10150	0.0490063	0.0443654	2.79e-05
1450	10157	0.0490063	0.0110914	2.79e-05
1451	10164	0.0490063	0.00277284	0.000207
1452	10171	0.0490063	0.00069321	2.68e-05
1453	10178	0.0490063	0.00138642	0.000263
1454	10185	0.0490063	0.00277284	2.75e-05
1455	10192	0.0490063	0.00069321	0.000238
1456	10199	0.0490063	0.00138642	2.77e-05
1457	10206	0.0490063	0.00277284	0.000236
1458	10213	0.0490063	0.00069321	2.71e-05
1459	10220	0.0490063	0.00138642	0.000248
1460	10227	0.0490063	0.00277284	2.73e-05
1461	10234	0.0490063	0.00554568	0.00025

1462	10241	0.0490063	0.0110914	0.00025
1463	10248	0.0490063	0.00277284	0.00025
1464	10255	0.0490063	0.00069321	2.74e-05
1465	10262	0.0490063	0.00069321	0.000236
1466	10269	0.0490063	0.00138642	2.73e-05
1467	10276	0.0490063	0.00277284	0.000237
1468	10283	0.0490063	0.00554568	2.76e-05
1469	10290	0.0490063	0.0110914	0.000236
1470	10297	0.0490063	0.0221827	2.74e-05
1471	10304	0.0490063	0.0443654	0.00024
1472	10311	0.0490063	0.0887308	2.84e-05
1473	10318	0.0490063	0.177462	0.000186
1474	10325	0.0490063	0.354923	0.000186
1475	10332	0.0490063	0.0887308	0.000186
1476	10339	0.0490063	0.0221827	0.000186
1477	10346	0.0490063	0.00554568	0.000186
1478	10353	0.0490063	0.00138642	2.64e-05
1479	10360	0.0490063	0.000346605	0.000324
1480	10367	0.0490063	0.00069321	2.81e-05
1481	10374	0.0490063	0.00138642	0.000201
1482	10381	0.0490063	0.00277284	2.67e-05
1483	10388	0.0490063	0.00554568	0.000279
1484	10395	0.0490063	0.0110914	0.000279
1485	10402	0.0490063	0.00277284	2.77e-05
1486	10409	0.0490063	0.00069321	0.000214
1487	10416	0.0490063	0.00138642	2.7e-05
1488	10423	0.0490063	0.00277284	0.000263
1489	10430	0.0490063	0.00554568	2.74e-05
1490	10437	0.0490063	0.0110914	0.000232
1491	10444	0.0490063	0.0221827	2.72e-05
1492	10451	0.0490063	0.0443654	0.000243
1493	10458	0.0490063	0.0887308	2.8e-05
1494	10465	0.0490063	0.177462	0.000183
1495	10472	0.0490063	0.354923	3.12e-05
1496	10479	0.0490063	0.709847	4.18e-05
1497	10486	0.0490063	1.41969	0.000981
1498	10493	0.0490063	1.41969	0.000981
1499	10500	0.0490063	0.354923	0.000981
1500	10507	0.0490063	0.0887308	0.000981
1501	10514	0.0490063	0.0221827	3.14e-05
1502	10521	0.0490063	0.00554568	0.000131
1503	10528	0.0490063	0.0110914	0.000131
1504	10535	0.0490063	0.00277284	0.000131
1505	10542	0.0490063	0.00069321	2.39e-05
1506	10549	0.0490063	0.00069321	0.000525
1507	10556	0.0490063	0.00138642	4.87e-05
1508	10563	0.0490063	0.00277284	0.000166
1509	10570	0.0490063	0.00554568	2.93e-05
1510	10577	0.0490063	0.0110914	0.000356
1511	10584	0.0490063	0.0221827	0.000356
1512	10591	0.0490063	0.00554568	0.000356
1513	10598	0.0490063	0.00138642	2.86e-05
1514	10605	0.0490063	0.00138642	0.000177
1515	10612	0.0490063	0.00138642	2.55e-05

1516	10619	0.0490063	0.000346605	0.000309
1517	10626	0.0490063	0.00069321	2.8e-05
1518	10633	0.0490063	0.00138642	0.000198
1519	10640	0.0490063	0.00138642	2.64e-05
1520	10647	0.0490063	0.00138642	0.000299
1521	10654	0.0490063	0.00277284	2.78e-05
1522	10661	0.0490063	0.00554568	0.000205
1523	10668	0.0490063	0.0110914	2.65e-05
1524	10675	0.0490063	0.0221827	0.00026
1525	10682	0.0490063	0.0443654	2.8e-05
1526	10689	0.0490063	0.0887308	0.000207
1527	10696	0.0490063	0.177462	0.000207
1528	10703	0.0490063	0.0443654	0.000207
1529	10710	0.0490063	0.0110914	0.000207
1530	10717	0.0490063	0.00277284	0.000207
1531	10724	0.0490063	0.00069321	2.67e-05
1532	10731	0.0490063	0.00069321	0.000255
1533	10738	0.0490063	0.00138642	2.71e-05
1534	10745	0.0490063	0.00138642	0.00022
1535	10752	0.0490063	0.00277284	2.71e-05
1536	10759	0.0490063	0.00554568	2.71e-05
1537	10766	0.0490063	0.00138642	0.00024
1538	10773	0.0490063	0.00138642	2.72e-05
1539	10780	0.0490063	0.00277284	0.000243
1540	10787	0.0490063	0.00554568	2.73e-05
1541	10794	0.0490063	0.0110914	2.73e-05
1542	10801	0.0490063	0.00277284	0.000236
1543	10808	0.0490063	0.00069321	2.7e-05
1544	10815	0.0490063	0.00138642	0.000237
1545	10822	0.0490063	0.00138642	2.7e-05
1546	10829	0.0490063	0.00277284	0.000232
1547	10836	0.0490063	0.00554568	2.64e-05
1548	10843	0.0490063	0.0110914	2.64e-05
1549	10850	0.0490063	0.00277284	0.00024
1550	10857	0.0490063	0.00069321	2.76e-05
1551	10864	0.0490063	0.00138642	0.000232
1552	10871	0.0490063	0.00277284	2.67e-05
1553	10878	0.0490063	0.00277284	0.000253
1554	10885	0.0490063	0.00069321	2.76e-05
1555	10892	0.0490063	0.00138642	0.000227
1556	10899	0.0490063	0.00277284	2.64e-05
1557	10906	0.0490063	0.00554568	0.00026
1558	10913	0.0490063	0.00554568	0.00026
1559	10920	0.0490063	0.00138642	2.72e-05
1560	10927	0.0490063	0.00138642	0.00022
1561	10934	0.0490063	0.00138642	2.69e-05
1562	10941	0.0490063	0.00277284	0.000258
1563	10948	0.0490063	0.00277284	2.77e-05
1564	10955	0.0490063	0.00277284	0.000229
1565	10962	0.0490063	0.00554568	2.68e-05
1566	10969	0.0490063	0.0110914	0.000246
1567	10976	0.0490063	0.0221827	2.74e-05
1568	10983	0.0490063	0.0443654	0.00023
1569	10990	0.0490063	0.0887308	2.79e-05

1570	10997	0.0490063	0.177462	0.000196
1571	11004	0.0490063	0.354923	3.17e-05
1572	11011	0.0490063	0.709847	4.17e-05
1573	11018	0.0490063	1.41969	0.00098
1574	11025	0.0490063	2.83939	0.00456
1575	11032	0.0490063	5.67877	0.00456
1576	11039	0.0490063	1.41969	0.0011
1577	11046	0.0490063	2.83939	0.00454
1578	11053	0.0490063	5.67877	0.00454
1579	11060	0.0490063	1.41969	0.00109
1580	11067	0.0490063	2.83939	0.00109
1581	11074	0.0490063	0.709847	0.00109
1582	11081	0.0490063	0.177462	0.00109
1583	11088	0.0490063	0.0443654	0.00109
1584	11095	0.0490063	0.0110914	3.19e-05
1585	11102	0.0490063	0.0110914	3.19e-05
1586	11109	0.0490063	0.00277284	3.19e-05
1587	11116	0.0490063	0.00069321	0.000152
1588	11123	0.0490063	0.00069321	2.6e-05
1589	11130	0.0490063	0.00069321	0.000412
1590	11137	0.0490063	0.00138642	2.88e-05
1591	11144	0.0490063	0.00138642	0.00017
1592	11151	0.0490063	0.00138642	2.55e-05
1593	11158	0.0490063	0.00277284	0.000333
1594	11165	0.0490063	0.00554568	0.000333
1595	11172	0.0490063	0.00138642	2.83e-05
1596	11179	0.0490063	0.00138642	0.000183
1597	11186	0.0490063	0.00277284	0.000183
1598	11193	0.0490063	0.00069321	2.6e-05
1599	11200	0.0490063	0.00069321	0.000332
1600	11207	0.0490063	0.00138642	2.88e-05
1601	11214	0.0490063	0.00277284	2.88e-05
1602	11221	0.0490063	0.00069321	0.000175
1603	11228	0.0490063	0.00069321	2.6e-05
1604	11235	0.0490063	0.00138642	0.000321
1605	11242	0.0490063	0.00277284	2.85e-05
1606	11249	0.0490063	0.00554568	0.000183
1607	11256	0.0490063	0.0110914	2.6e-05
1608	11263	0.0490063	0.0221827	2.6e-05
1609	11270	0.0490063	0.00554568	2.6e-05
1610	11277	0.0490063	0.00138642	0.000308
1611	11284	0.0490063	0.00138642	2.76e-05
1612	11291	0.0490063	0.00277284	0.000207
1613	11298	0.0490063	0.00069321	2.61e-05
1614	11305	0.0490063	0.00069321	0.0003
1615	11312	0.0490063	0.00138642	2.77e-05
1616	11319	0.0490063	0.00277284	0.000215
1617	11326	0.0490063	0.00069321	2.72e-05
1618	11333	0.0490063	0.00138642	0.000247
1619	11340	0.0490063	0.00138642	2.68e-05
1620	11347	0.0490063	0.00277284	0.000235
1621	11354	0.0490063	0.00554568	2.73e-05
1622	11361	0.0490063	0.0110914	2.73e-05
1623	11368	0.0490063	0.00277284	0.000238

1624	11375	0.0490063	0.00069321	2.69e-05
1625	11382	0.0490063	0.00069321	0.000227
1626	11389	0.0490063	0.00138642	2.7e-05
1627	11396	0.0490063	0.00277284	0.000262
1628	11403	0.0490063	0.00277284	2.73e-05
1629	11410	0.0490063	0.00554568	2.73e-05
1630	11417	0.0490063	0.00138642	0.000221
1631	11424	0.0490063	0.00138642	2.71e-05
1632	11431	0.0490063	0.00277284	0.000247
1633	11438	0.0490063	0.00554568	2.76e-05
1634	11445	0.0490063	0.0110914	0.000225
1635	11452	0.0490063	0.0221827	2.69e-05
1636	11459	0.0490063	0.0443654	0.000243
1637	11466	0.0490063	0.0887308	0.000243
1638	11473	0.0490063	0.0221827	0.000243
1639	11480	0.0490063	0.00554568	0.000243
1640	11487	0.0490063	0.00138642	2.69e-05
1641	11494	0.0490063	0.00138642	0.000235
1642	11501	0.0490063	0.00277284	0.000235
1643	11508	0.0490063	0.00069321	2.75e-05
1644	11515	0.0490063	0.00069321	0.000236
1645	11522	0.0490063	0.00138642	2.68e-05
1646	11529	0.0490063	0.00277284	0.000265
1647	11536	0.0490063	0.00277284	2.7e-05
1648	11543	0.0490063	0.00069321	0.000246
1649	11550	0.0490063	0.00138642	2.74e-05
1650	11557	0.0490063	0.00277284	0.00022
1651	11564	0.0490063	0.00069321	2.69e-05
1652	11571	0.0490063	0.00069321	0.000245
1653	11578	0.0490063	0.00138642	2.71e-05
1654	11585	0.0490063	0.00138642	0.000236
1655	11592	0.0490063	0.00277284	0.000236
1656	11599	0.0490063	0.00069321	2.73e-05
1657	11606	0.0490063	0.00069321	0.000249
1658	11613	0.0490063	0.00138642	2.74e-05
1659	11620	0.0490063	0.00277284	0.000198
1660	11627	0.0490063	0.00554568	2.62e-05
1661	11634	0.0490063	0.0110914	0.000289
1662	11641	0.0490063	0.0221827	2.73e-05
1663	11648	0.0490063	0.0443654	0.00021
1664	11655	0.0490063	0.0887308	0.00021
1665	11662	0.0490063	0.0221827	0.00021
1666	11669	0.0490063	0.00554568	0.00021
1667	11676	0.0490063	0.00138642	2.65e-05
1668	11683	0.0490063	0.00138642	0.000283
1669	11690	0.0490063	0.00138642	2.78e-05
1670	11697	0.0490063	0.00138642	0.000205
1671	11704	0.0490063	0.00277284	2.57e-05
1672	11711	0.0490063	0.00554568	0.000288
1673	11718	0.0490063	0.0110914	2.8e-05
1674	11725	0.0490063	0.0221827	0.000204
1675	11732	0.0490063	0.0443654	2.65e-05
1676	11739	0.0490063	0.0887308	2.65e-05
1677	11746	0.0490063	0.0221827	2.65e-05

1678	11753	0.0490063	0.00554568	2.65e-05
1679	11760	0.0490063	0.00138642	0.000272
1680	11767	0.0490063	0.00138642	2.72e-05
1681	11774	0.0490063	0.00138642	0.000214
1682	11781	0.0490063	0.00277284	2.68e-05
1683	11788	0.0490063	0.00554568	2.68e-05
1684	11795	0.0490063	0.00138642	0.000241
1685	11802	0.0490063	0.00138642	2.73e-05
1686	11809	0.0490063	0.00138642	0.00021
1687	11816	0.0490063	0.00138642	2.67e-05
1688	11823	0.0490063	0.00277284	0.000253
1689	11830	0.0490063	0.00554568	0.000253
1690	11837	0.0490063	0.00138642	2.7e-05
1691	11844	0.0490063	0.00138642	0.000228
1692	11851	0.0490063	0.00138642	2.7e-05
1693	11858	0.0490063	0.00277284	0.000231
1694	11865	0.0490063	0.00554568	0.000231
1695	11872	0.0490063	0.00138642	2.66e-05
1696	11879	0.0490063	0.00138642	0.000232
1697	11886	0.0490063	0.00277284	2.71e-05
1698	11893	0.0490063	0.00554568	2.71e-05
1699	11900	0.0490063	0.00138642	0.000232
1700	11907	0.0490063	0.00138642	2.68e-05
1701	11914	0.0490063	0.00277284	0.000233
1702	11921	0.0490063	0.00069321	2.65e-05
1703	11928	0.0490063	0.00138642	0.000245
1704	11935	0.0490063	0.00277284	2.69e-05
1705	11942	0.0490063	0.00277284	0.000226
1706	11949	0.0490063	0.00277284	2.71e-05
1707	11956	0.0490063	0.00554568	0.00025
1708	11963	0.0490063	0.0110914	2.73e-05
1709	11970	0.0490063	0.0221827	0.000217
1710	11977	0.0490063	0.0443654	2.61e-05
1711	11984	0.0490063	0.0887308	0.00027
1712	11991	0.0490063	0.177462	3.15e-05
1713	11998	0.0490063	0.354923	5.13e-05
1714	12005	0.0490063	0.709847	5.13e-05
1715	12012	0.0490063	0.177462	5.13e-05
1716	12019	0.0490063	0.0443654	5.13e-05
1717	12026	0.0490063	0.0110914	5.13e-05
1718	12033	0.0490063	0.00277284	5.13e-05
1719	12040	0.0490063	0.00069321	5.13e-05
1720	12047	0.0490063	0.000173302	2.53e-05
1721	12054	0.0490063	0.000173302	0.000342
1722	12061	0.0490063	0.000346605	2.83e-05
1723	12068	0.0490063	0.00069321	0.000182
1724	12075	0.0490063	0.00138642	2.54e-05
1725	12082	0.0490063	0.00277284	0.000315
1726	12089	0.0490063	0.00277284	2.79e-05
1727	12096	0.0490063	0.00554568	0.000211
1728	12103	0.0490063	0.0110914	2.6e-05
1729	12110	0.0490063	0.0221827	2.6e-05
1730	12117	0.0490063	0.00554568	2.6e-05
1731	12124	0.0490063	0.00138642	0.000286

1732	12131	0.0490063	0.00138642	2.77e-05
1733	12138	0.0490063	0.00138642	0.000199
1734	12145	0.0490063	0.00277284	2.58e-05
1735	12152	0.0490063	0.00554568	0.000279
1736	12159	0.0490063	0.0110914	0.000279
1737	12166	0.0490063	0.00277284	2.77e-05
1738	12173	0.0490063	0.00069321	0.00021
1739	12180	0.0490063	0.00138642	2.59e-05
1740	12187	0.0490063	0.00277284	0.000283
1741	12194	0.0490063	0.00554568	2.77e-05
1742	12201	0.0490063	0.00554568	0.000203
1743	12208	0.0490063	0.0110914	2.59e-05
1744	12215	0.0490063	0.0221827	0.00028
1745	12222	0.0490063	0.0443654	0.00028
1746	12229	0.0490063	0.0110914	0.00028
1747	12236	0.0490063	0.00277284	2.76e-05
1748	12243	0.0490063	0.00069321	0.000212
1749	12250	0.0490063	0.00138642	2.65e-05
1750	12257	0.0490063	0.00277284	0.000249
1751	12264	0.0490063	0.00277284	2.76e-05
1752	12271	0.0490063	0.00554568	0.000205
1753	12278	0.0490063	0.0110914	0.000205
1754	12285	0.0490063	0.00277284	0.000205
1755	12292	0.0490063	0.00069321	2.6e-05
1756	12299	0.0490063	0.00069321	0.000271
1757	12306	0.0490063	0.00138642	2.72e-05
1758	12313	0.0490063	0.00277284	0.000219
1759	12320	0.0490063	0.00554568	2.62e-05
1760	12327	0.0490063	0.0110914	2.62e-05
1761	12334	0.0490063	0.00277284	0.000246
1762	12341	0.0490063	0.00277284	2.71e-05
1763	12348	0.0490063	0.00554568	0.000227
1764	12355	0.0490063	0.0110914	2.65e-05
1765	12362	0.0490063	0.0221827	0.000233
1766	12369	0.0490063	0.0443654	2.66e-05
1767	12376	0.0490063	0.0887308	2.66e-05
1768	12383	0.0490063	0.0221827	2.66e-05
1769	12390	0.0490063	0.00554568	2.66e-05
1770	12397	0.0490063	0.00138642	0.000242
1771	12404	0.0490063	0.00138642	2.67e-05
1772	12411	0.0490063	0.00138642	0.000222
1773	12418	0.0490063	0.00277284	2.64e-05
1774	12425	0.0490063	0.00554568	2.64e-05
1775	12432	0.0490063	0.00138642	0.000242
1776	12439	0.0490063	0.00138642	2.66e-05
1777	12446	0.0490063	0.00277284	0.000229
1778	12453	0.0490063	0.00554568	0.000229
1779	12460	0.0490063	0.00138642	2.61e-05
1780	12467	0.0490063	0.00138642	0.00027
1781	12474	0.0490063	0.00277284	2.73e-05
1782	12481	0.0490063	0.00554568	2.73e-05
1783	12488	0.0490063	0.00138642	0.000226
1784	12495	0.0490063	0.00138642	2.62e-05
1785	12502	0.0490063	0.00277284	0.000236

1786	12509	0.0490063	0.00554568	2.65e-05
1787	12516	0.0490063	0.0110914	0.000223
1788	12523	0.0490063	0.0221827	0.000223
1789	12530	0.0490063	0.00554568	0.000223
1790	12537	0.0490063	0.00138642	2.65e-05
1791	12544	0.0490063	0.00138642	0.000244
1792	12551	0.0490063	0.00138642	2.64e-05
1793	12558	0.0490063	0.00138642	0.000233
1794	12565	0.0490063	0.00277284	0.000233
1795	12572	0.0490063	0.00069321	2.63e-05
1796	12579	0.0490063	0.00069321	0.000245
1797	12586	0.0490063	0.00138642	2.63e-05
1798	12593	0.0490063	0.00138642	0.000211
1799	12600	0.0490063	0.00138642	2.61e-05
1800	12607	0.0490063	0.00138642	0.000251
1801	12614	0.0490063	0.00277284	2.63e-05
1802	12621	0.0490063	0.00277284	0.000234
1803	12628	0.0490063	0.00554568	0.000234
1804	12635	0.0490063	0.00138642	2.62e-05
1805	12642	0.0490063	0.00138642	0.000263
1806	12649	0.0490063	0.00277284	2.64e-05
1807	12656	0.0490063	0.00554568	0.00023
1808	12663	0.0490063	0.0110914	2.65e-05
1809	12670	0.0490063	0.0221827	0.000246
1810	12677	0.0490063	0.0443654	2.69e-05
1811	12684	0.0490063	0.0887308	0.00021
1812	12691	0.0490063	0.177462	0.00021
1813	12698	0.0490063	0.0443654	0.00021
1814	12705	0.0490063	0.0110914	0.00021
1815	12712	0.0490063	0.00277284	0.00021
1816	12719	0.0490063	0.00069321	2.62e-05
1817	12726	0.0490063	0.00069321	0.000245
1818	12733	0.0490063	0.00138642	2.71e-05
1819	12740	0.0490063	0.00277284	0.00021
1820	12747	0.0490063	0.00554568	2.6e-05
1821	12754	0.0490063	0.0110914	0.000244
1822	12761	0.0490063	0.0221827	2.64e-05
1823	12768	0.0490063	0.0443654	0.000227
1824	12775	0.0490063	0.0443654	2.67e-05
1825	12782	0.0490063	0.0443654	2.67e-05
1826	12789	0.0490063	0.0110914	2.67e-05
1827	12796	0.0490063	0.00277284	0.000238
1828	12803	0.0490063	0.00069321	2.65e-05
1829	12810	0.0490063	0.00138642	0.000221
1830	12817	0.0490063	0.00138642	2.61e-05
1831	12824	0.0490063	0.00277284	0.000252
1832	12831	0.0490063	0.00554568	0.000252
1833	12838	0.0490063	0.00138642	2.67e-05
1834	12845	0.0490063	0.00138642	0.000216
1835	12852	0.0490063	0.00277284	2.64e-05
1836	12859	0.0490063	0.00554568	0.000249
1837	12866	0.0490063	0.0110914	2.61e-05
1838	12873	0.0490063	0.0221827	0.000235
1839	12880	0.0490063	0.0443654	2.65e-05

1840	12887	0.0490063	0.0887308	0.000238
1841	12894	0.0490063	0.177462	3.02e-05
1842	12901	0.0490063	0.354923	5.94e-05
1843	12908	0.0490063	0.709847	0.000206
1844	12915	0.0490063	0.709847	0.000223
1845	12922	0.0490063	1.41969	0.00107
1846	12929	0.0490063	2.83939	0.00448
1847	12936	0.0490063	2.83939	0.00445
1848	12943	0.0490063	5.67877	0.00445
1849	12950	0.0490063	1.41969	0.00445
1850	12957	0.0490063	0.354923	5.21e-05
1851	12964	0.0490063	0.354923	3.11e-05
1852	12971	0.0490063	0.709847	3.08e-05
1853	12978	0.0490063	1.41969	0.000802
1854	12985	0.0490063	2.83939	0.00443
1855	12992	0.0490063	2.83939	0.00443
1856	12999	0.0490063	0.709847	0.000266
1857	13006	0.0490063	0.177462	0.000266
1858	13013	0.0490063	0.0443654	0.000266
1859	13020	0.0490063	0.0110914	0.000266
1860	13027	0.0490063	0.00277284	2.73e-05
1861	13034	0.0490063	0.00069321	0.000271
1862	13041	0.0490063	0.00138642	2.81e-05
1863	13048	0.0490063	0.00277284	0.000221
1864	13055	0.0490063	0.00554568	2.69e-05
1865	13062	0.0490063	0.0110914	0.000239
1866	13069	0.0490063	0.0221827	0.000239
1867	13076	0.0490063	0.00554568	0.000239
1868	13083	0.0490063	0.00138642	2.73e-05
1869	13090	0.0490063	0.00138642	0.000215
1870	13097	0.0490063	0.00277284	2.7e-05
1871	13104	0.0490063	0.00554568	0.000235
1872	13111	0.0490063	0.0110914	0.000235
1873	13118	0.0490063	0.00277284	0.000235
1874	13125	0.0490063	0.00069321	2.69e-05
1875	13132	0.0490063	0.00069321	0.000231
1876	13139	0.0490063	0.00138642	2.63e-05
1877	13146	0.0490063	0.00277284	0.000231
1878	13153	0.0490063	0.00554568	0.000231
1879	13160	0.0490063	0.00138642	2.66e-05
1880	13167	0.0490063	0.00138642	0.000235
1881	13174	0.0490063	0.00277284	2.62e-05
1882	13181	0.0490063	0.00554568	2.62e-05
1883	13188	0.0490063	0.00138642	0.000244
1884	13195	0.0490063	0.00138642	2.71e-05
1885	13202	0.0490063	0.00277284	0.000215
1886	13209	0.0490063	0.00277284	2.64e-05
1887	13216	0.0490063	0.00554568	0.000253
1888	13223	0.0490063	0.0110914	0.000253
1889	13230	0.0490063	0.00277284	2.63e-05
1890	13237	0.0490063	0.00069321	0.000224
1891	13244	0.0490063	0.00138642	2.67e-05
1892	13251	0.0490063	0.00277284	0.000232
1893	13258	0.0490063	0.00554568	2.68e-05

1894	13265	0.0490063	0.00554568	0.000241
1895	13272	0.0490063	0.0110914	2.68e-05
1896	13279	0.0490063	0.0221827	0.000226
1897	13286	0.0490063	0.0443654	2.64e-05
1898	13293	0.0490063	0.0443654	0.000251
1899	13300	0.0490063	0.0887308	2.8e-05
1900	13307	0.0490063	0.0887308	0.000177
1901	13314	0.0490063	0.177462	2.15e-05
1902	13321	0.0490063	0.354923	2.15e-05
1903	13328	0.0490063	0.0887308	2.15e-05
1904	13335	0.0490063	0.0221827	0.000946
1905	13342	0.0490063	0.0221827	5.19e-05
1906	13349	0.0490063	0.0443654	5.19e-05
1907	13356	0.0490063	0.0110914	5.19e-05
1908	13363	0.0490063	0.00277284	5.19e-05
1909	13370	0.0490063	0.00069321	0.00014
1910	13377	0.0490063	0.00069321	3.54e-05
1911	13384	0.0490063	0.00138642	0.000454
1912	13391	0.0490063	0.00277284	2.89e-05
1913	13398	0.0490063	0.00554568	0.00016
1914	13405	0.0490063	0.00554568	2.46e-05
1915	13412	0.0490063	0.0110914	0.000322
1916	13419	0.0490063	0.0221827	2.75e-05
1917	13426	0.0490063	0.0443654	2.75e-05
1918	13433	0.0490063	0.0110914	2.75e-05
1919	13440	0.0490063	0.00277284	0.000183
1920	13447	0.0490063	0.00069321	2.55e-05
1921	13454	0.0490063	0.00069321	0.000291
1922	13461	0.0490063	0.00138642	2.68e-05
1923	13468	0.0490063	0.00277284	0.000197
1924	13475	0.0490063	0.00069321	2.56e-05
1925	13482	0.0490063	0.00138642	0.000271
1926	13489	0.0490063	0.00277284	2.67e-05
1927	13496	0.0490063	0.00554568	2.67e-05
1928	13503	0.0490063	0.00138642	0.000213
1929	13510	0.0490063	0.00138642	2.58e-05
1930	13517	0.0490063	0.00277284	0.000272
1931	13524	0.0490063	0.00277284	2.71e-05
1932	13531	0.0490063	0.00554568	0.0002
1933	13538	0.0490063	0.0110914	2.62e-05
1934	13545	0.0490063	0.0221827	0.000244
1935	13552	0.0490063	0.0443654	0.000244
1936	13559	0.0490063	0.0110914	0.000244
1937	13566	0.0490063	0.00277284	0.000244
1938	13573	0.0490063	0.00069321	2.66e-05
1939	13580	0.0490063	0.00069321	0.000218
1940	13587	0.0490063	0.00138642	2.64e-05
1941	13594	0.0490063	0.00277284	0.000249
1942	13601	0.0490063	0.00554568	0.000249
1943	13608	0.0490063	0.00138642	2.64e-05
1944	13615	0.0490063	0.00138642	0.000225
1945	13622	0.0490063	0.00277284	0.000225
1946	13629	0.0490063	0.00069321	2.66e-05
1947	13636	0.0490063	0.00069321	0.000239

1948	13643	0.0490063	0.00138642	2.65e-05
1949	13650	0.0490063	0.00277284	0.00023
1950	13657	0.0490063	0.00554568	0.00023
1951	13664	0.0490063	0.00138642	2.66e-05
1952	13671	0.0490063	0.00138642	0.000241
1953	13678	0.0490063	0.00138642	2.64e-05
1954	13685	0.0490063	0.00277284	0.00023
1955	13692	0.0490063	0.00554568	0.00023
1956	13699	0.0490063	0.00138642	2.56e-05
1957	13706	0.0490063	0.00138642	0.000245
1958	13713	0.0490063	0.00277284	2.64e-05
1959	13720	0.0490063	0.00554568	2.64e-05
1960	13727	0.0490063	0.00138642	0.000226
1961	13734	0.0490063	0.00138642	2.67e-05
1962	13741	0.0490063	0.00138642	0.000231
1963	13748	0.0490063	0.00138642	2.64e-05
1964	13755	0.0490063	0.00277284	0.000235
1965	13762	0.0490063	0.00277284	2.62e-05
1966	13769	0.0490063	0.00554568	0.00025
1967	13776	0.0490063	0.0110914	0.00025
1968	13783	0.0490063	0.00277284	2.63e-05
1969	13790	0.0490063	0.00069321	0.000223
1970	13797	0.0490063	0.00138642	2.62e-05
1971	13804	0.0490063	0.000346605	0.000243
1972	13811	0.0490063	0.00069321	2.6e-05
1973	13818	0.0490063	0.00138642	0.000246
1974	13825	0.0490063	0.00277284	2.63e-05
1975	13832	0.0490063	0.00069321	0.000218
1976	13839	0.0490063	0.00138642	2.54e-05
1977	13846	0.0490063	0.00277284	0.000256
1978	13853	0.0490063	0.00554568	0.000256
1979	13860	0.0490063	0.00138642	2.71e-05
1980	13867	0.0490063	0.00138642	0.000201
1981	13874	0.0490063	0.00277284	0.000201
1982	13881	0.0490063	0.00069321	2.52e-05
1983	13888	0.0490063	0.00069321	0.00026
1984	13895	0.0490063	0.00138642	2.67e-05
1985	13902	0.0490063	0.00277284	0.000215
1986	13909	0.0490063	0.00554568	2.62e-05
1987	13916	0.0490063	0.0110914	2.62e-05
1988	13923	0.0490063	0.00277284	0.000233
1989	13930	0.0490063	0.00069321	2.61e-05
1990	13937	0.0490063	0.00138642	0.000224
1991	13944	0.0490063	0.00277284	2.59e-05
1992	13951	0.0490063	0.00554568	2.59e-05
1993	13958	0.0490063	0.00138642	0.000239
1994	13965	0.0490063	0.00138642	2.63e-05
1995	13972	0.0490063	0.00138642	0.000225
1996	13979	0.0490063	0.00138642	2.63e-05
1997	13986	0.0490063	0.00277284	0.000233
1998	13993	0.0490063	0.00069321	2.6e-05
1999	14000	0.0490063	0.00138642	0.000227
2000	14007	0.0490063	0.00277284	2.62e-05
2001	14014	0.0490063	0.00554568	0.000242

2002	14021	0.0490063	0.0110914	2.66e-05
2003	14028	0.0490063	0.0221827	0.000229
2004	14035	0.0490063	0.0443654	0.000229
2005	14042	0.0490063	0.0110914	0.000229
2006	14049	0.0490063	0.00277284	0.000229
2007	14056	0.0490063	0.00069321	2.58e-05
2008	14063	0.0490063	0.00069321	0.00024
2009	14070	0.0490063	0.00138642	2.63e-05
2010	14077	0.0490063	0.00277284	0.000232
2011	14084	0.0490063	0.00554568	2.56e-05
2012	14091	0.0490063	0.0110914	0.000229
2013	14098	0.0490063	0.0221827	2.57e-05
2014	14105	0.0490063	0.0221827	0.00024
2015	14112	0.0490063	0.0443654	2.6e-05
2016	14119	0.0490063	0.0443654	2.6e-05
2017	14126	0.0490063	0.0110914	2.6e-05
2018	14133	0.0490063	0.00277284	0.000212
2019	14140	0.0490063	0.00069321	2.62e-05
2020	14147	0.0490063	0.00138642	0.000236
2021	14154	0.0490063	0.00277284	2.59e-05
2022	14161	0.0490063	0.00554568	0.000227
2023	14168	0.0490063	0.0110914	2.65e-05
2024	14175	0.0490063	0.0221827	0.000223
2025	14182	0.0490063	0.0221827	2.61e-05
2026	14189	0.0490063	0.0443654	0.000224
2027	14196	0.0490063	0.0887308	0.000224
2028	14203	0.0490063	0.0221827	0.000224
2029	14210	0.0490063	0.00554568	0.000224
2030	14217	0.0490063	0.00138642	2.61e-05
2031	14224	0.0490063	0.00138642	0.000248
2032	14231	0.0490063	0.00277284	2.62e-05
2033	14238	0.0490063	0.00554568	0.000222
2034	14245	0.0490063	0.0110914	2.61e-05
2035	14252	0.0490063	0.0221827	0.00022
2036	14259	0.0490063	0.0443654	2.54e-05
2037	14266	0.0490063	0.0887308	0.000248
2038	14273	0.0490063	0.177462	0.000248
2039	14280	0.0490063	0.0443654	0.000248
2040	14287	0.0490063	0.0110914	0.000248
2041	14294	0.0490063	0.00277284	0.000248
2042	14301	0.0490063	0.00069321	2.62e-05
2043	14308	0.0490063	0.00069321	0.00022
2044	14315	0.0490063	0.00138642	2.6e-05
2045	14322	0.0490063	0.00277284	0.000244
2046	14329	0.0490063	0.00554568	2.63e-05
2047	14336	0.0490063	0.0110914	2.63e-05
2048	14343	0.0490063	0.00277284	0.000202
2049	14350	0.0490063	0.00069321	2.55e-05
2050	14357	0.0490063	0.00138642	0.000246
2051	14364	0.0490063	0.00138642	2.67e-05
2052	14371	0.0490063	0.00138642	0.000203
2053	14378	0.0490063	0.00277284	2.54e-05
2054	14385	0.0490063	0.00554568	2.54e-05
2055	14392	0.0490063	0.00138642	0.000258

2056	14399	0.0490063	0.00138642	2.63e-05
2057	14406	0.0490063	0.00277284	0.000209
2058	14413	0.0490063	0.00069321	2.54e-05
2059	14420	0.0490063	0.00138642	0.000257
2060	14427	0.0490063	0.00277284	2.66e-05
2061	14434	0.0490063	0.00554568	0.000216
2062	14441	0.0490063	0.00554568	2.57e-05
2063	14448	0.0490063	0.00554568	2.57e-05
2064	14455	0.0490063	0.00138642	0.00024
2065	14462	0.0490063	0.00138642	2.62e-05
2066	14469	0.0490063	0.00277284	0.000218
2067	14476	0.0490063	0.00554568	2.58e-05
2068	14483	0.0490063	0.00554568	2.58e-05
2069	14490	0.0490063	0.00138642	0.000227
2070	14497	0.0490063	0.00138642	2.64e-05
2071	14504	0.0490063	0.00277284	0.000235
2072	14511	0.0490063	0.00277284	2.58e-05
2073	14518	0.0490063	0.00554568	0.000237
2074	14525	0.0490063	0.0110914	2.61e-05
2075	14532	0.0490063	0.0221827	0.000232
2076	14539	0.0490063	0.0443654	2.6e-05
2077	14546	0.0490063	0.0887308	0.000213
2078	14553	0.0490063	0.177462	2.18e-05
2079	14560	0.0490063	0.354923	0.000763
2080	14567	0.0490063	0.354923	4.46e-05
2081	14574	0.0490063	0.709847	0.00016
2082	14581	0.0490063	1.41969	0.00104
2083	14588	0.0490063	2.83939	0.00104
2084	14595	0.0490063	0.709847	0.00104
2085	14602	0.0490063	0.177462	0.00104
2086	14609	0.0490063	0.0443654	0.00104
2087	14616	0.0490063	0.0110914	3e-05
2088	14623	0.0490063	0.0110914	0.000125
2089	14630	0.0490063	0.0110914	0.000125
2090	14637	0.0490063	0.00277284	0.000125
2091	14644	0.0490063	0.00069321	2.23e-05
2092	14651	0.0490063	0.00069321	0.000496
2093	14658	0.0490063	0.00138642	4.55e-05
2094	14665	0.0490063	0.00277284	0.000162
2095	14672	0.0490063	0.00554568	2.85e-05
2096	14679	0.0490063	0.0110914	2.85e-05
2097	14686	0.0490063	0.00277284	0.000318
2098	14693	0.0490063	0.00277284	2.71e-05
2099	14700	0.0490063	0.00554568	0.000192
2100	14707	0.0490063	0.0110914	2.55e-05
2101	14714	0.0490063	0.0110914	0.000251
2102	14721	0.0490063	0.0221827	2.68e-05
2103	14728	0.0490063	0.0443654	0.0002
2104	14735	0.0490063	0.0887308	2.51e-05
2105	14742	0.0490063	0.177462	0.0003
2106	14749	0.0490063	0.354923	0.0003
2107	14756	0.0490063	0.0887308	0.0003
2108	14763	0.0490063	0.0221827	0.0003
2109	14770	0.0490063	0.00554568	0.0003

```
  2110      14777      0.0490063     0.00138642       2.63e-05
  2111      14784      0.0490063     0.00138642       0.000188
  2112      14791      0.0490063     0.00277284       2.55e-05
  2113      14798      0.0490063     0.00554568       0.000246
  2114      14805      0.0490063      0.0110914        2.6e-05
  2115      14812      0.0490063      0.0221827       0.000229
  2116      14819      0.0490063      0.0443654       2.58e-05
  2117      14826      0.0490063      0.0887308       0.000221
  2118      14833      0.0490063       0.177462       2.94e-05
  2119      14840      0.0490063       0.354923       7.26e-05
  2120      14847      0.0490063       0.354923       3.58e-05
  2121      14854      0.0490063       0.354923       3.58e-05
  2122      14861      0.0490063      0.0887308       3.58e-05
  2123      14868      0.0490063      0.0221827       3.58e-05
  2124      14875      0.0490063     0.00554568       3.58e-05
  2125      14882      0.0490063     0.00138642       3.58e-05
  2126      14889      0.0490063    0.000346605       5.01e-05
  2127      14896      0.0490063    0.000346605       2.39e-05

Local minimum possible.

lsqnonlin stopped because the final change in the sum of squares
 relative to
its initial value is less than the selected value of the function
 tolerance.
```

In addition to the data, it is also necessary to specify that the 'Zero' curve should be estimated, which compounding and day count convention the estimated curve should follow: ('Compounding', -1) and ('Basis', 8), respectively. This means that continous compounding is used and the day count convention 'actual/actual'.\footnote{See the Matlab help documentation for a list of day count conventions and their numerical equivalent.}. Similarly, for the bond universe that provides the foundation for the calculations, the coupon frequency should be provided for each bond ('InstrumentPeriod', cpn_freq,), and the day count convention for each bond ('InstrumentBasis', day_cnt). For the bond universe used in the current example, the first four bonds are qouted using the convention of 'actual/360', which in Matlab terminology is equivalent to '0'; and the remaining bonds are quoted using 'actual/actual', which is equivalent to a nummerical value in Matlab of of 8.

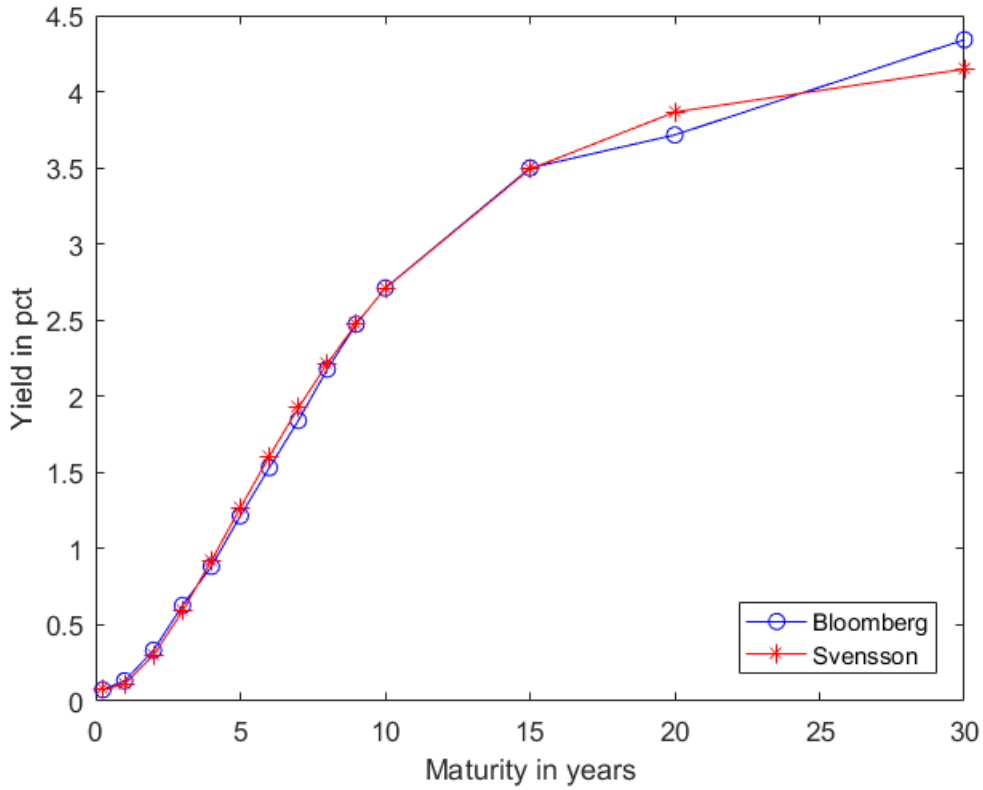
After the model parameters have been estimated the Svensson zero curve is found by extracting the vector from the structured variable 'est_Svensson'. This is done here:

```
tau_m     = settle_(1,1) + 365*tau_;
y_zero_SS = est_Svensson.getZeroRates(tau_m).*100;
```

And, the resulting Svensson-Soderlind zero coupon curve is plotted along side the zero curve reported by Bloomberg.

```
figure
plot(tau_,y_ES,'-ob'), ...% title('Figure 3: Spain - Gov Curve on 11
 AUG 2014'), ...
                    xlabel('Maturity in years'), ylabel('Yield in
 pct')
hold on
```

```
plot(tau_,y_zero_SS,'-*r'),
 legend('Bloomberg','Svensson','Location','SouthEast')

saveas(gcf,'SvenssonZC.eps', 'psc2')
```



There are two additional built-in curve fitting models available in Matlab's toolbox: Nelson-Siegel and Smoothing Splie. These models are estimated below following the principles outlined above and using the same data as above.

The Nelson-Siegel model requires less parameters than the Svensson model. While Svensson relies on a parametrisation of the yield curve using a Level, Slope, Curvature1 and Curvature2 factors, and estimates time-decay parameters for the two curveature factors, the Nelson-Siegel model relies on a more parsimonious parametrisation comprising Level, Slope and just one Curvature factor. For this reason the input parameters need to be adjusted.

```
b_1   = [ 4.00  -3.00  0.40  1.00 ];
lb_1  = [ 0.00  -inf   -inf  0.00 ];
ub_1  = [ 25.0   inf    inf  inf  ];

fitOptions_ns  =
 IRFitOptions(b_1, 'FitType', 'durationweightedprice', ...
                                  'LowerBound', lb_1, 'UpperBound',
 ub_1, ...
                                  'OptOptions', optOptions_ );

est_NS = IRFunctionCurve.fitNelsonSiegel('Zero', settle_(1,1),
 Instruments_, ...
```

```
                                                    'Compounding',
 -1, ...
                                                    'Basis', 8, ...
                                                    'InstrumentPeriod',
 cpn_freq, ...
                                                    'InstrumentBasis',
 day_cnt, ...
                                                    'IRFitOptions',
 fitOptions_ns);
y_zero_NS = est_NS.getZeroRates(tau_m).*100;
```

Iteration	Func-count	f(x)	Norm of step	First-order optimality
0	5	56.4934		116
1	10	14.8792	0.55559	14.1
2	15	14.8792	10	14.1
3	20	13.307	2.5	8.69
4	25	10.7139	2.5	3.53
5	30	10.7139	2.5	3.53
6	35	9.91665	0.625	56
7	40	9.54127	1.25	4.02
8	45	6.86219	1.25	28.1
9	50	5.67289	2.5	16.6
10	55	3.48459	2.5	6.81
11	60	1.5867	5	11.1
12	65	0.522915	5.97339	4.58
13	70	0.42435	1.55641	0.0486
14	75	0.41333	3.31012	0.336
15	80	0.409857	0.361886	0.00696
16	85	0.400593	5.32237	0.149
17	90	0.395689	0.51875	0.00104
18	95	0.395606	0.125764	0.000595
19	100	0.395605	0.00515061	0.00021
20	105	0.395605	0.0013878	4.94e-05
21	110	0.395605	0.000125574	6.33e-07
22	115	0.395605	8.92963e-06	6.33e-07
23	120	0.395605	2.23241e-06	6.33e-07
24	125	0.395605	5.58102e-07	1.72e-06
25	130	0.395605	1.39525e-07	1.72e-06
26	135	0.395605	3.48814e-08	2.52e-06
27	140	0.395605	3.48814e-08	4.64e-06

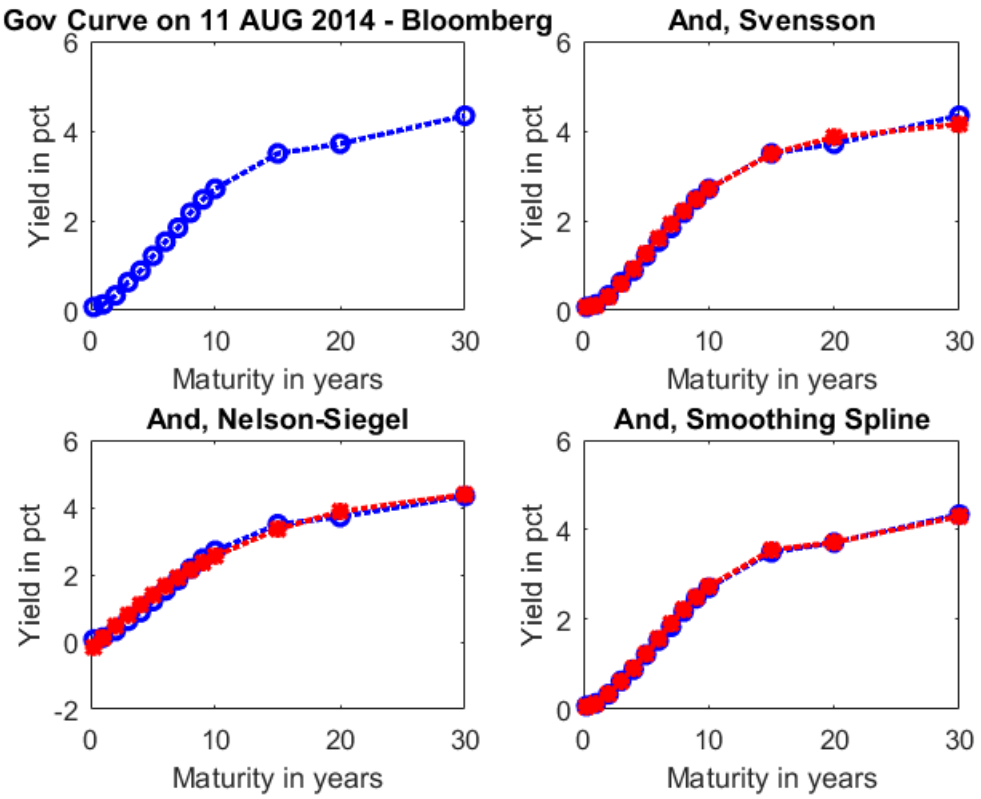
```
Local minimum possible.

lsqnonlin stopped because the final change in the sum of squares
 relative to
its initial value is less than the selected value of the function
 tolerance.
```

To estimate the Smoothing Spline curve, the input parameters have to be adjusted accordingly. The 'penalty_fx' is a penalty funcition that is used to ensure a certain smoothness of the forward curve. The parameter values for L, S and mu are based on the example shown in the Matlab help documentation.

```
L = 9.2; S = -1; mu = 1;
penalty_fx = @(t) exp(L - (L-S)*exp(-t/mu));

est_SmSpline = IRFunctionCurve.fitSmoothingSpline('Zero',
 settle_(1,1), Instruments_, ...
                                                   penalty_fx, ...
                                                   'Compounding',
 -1, ...
                                                   'Basis', 8, ...
                                                   'InstrumentPeriod',
 cpn_freq, ...
                                                   'InstrumentBasis',
 day_cnt );

y_zero_SmSpline = est_SmSpline.getZeroRates(tau_m).*100;
```

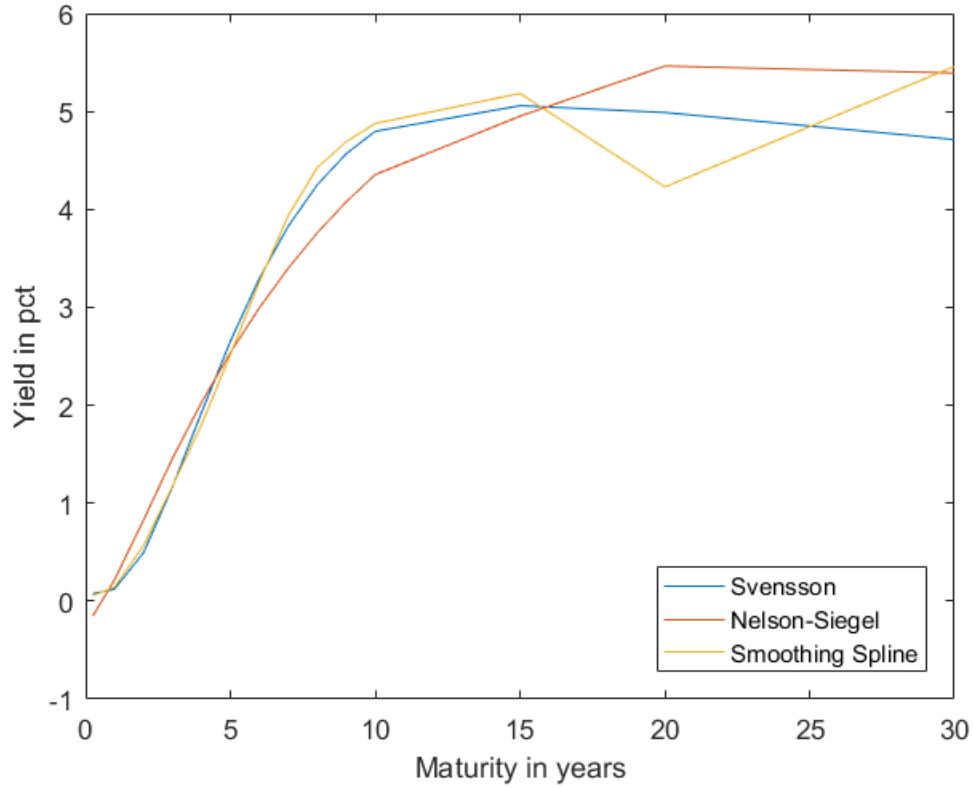
For comparison, Figure 4 plots the estimated Nelson-Siegel and Smoothing Spline curves together with the Svensson and Bloomberg curves.

```
figure
subplot(2,2,1), plot(tau_,y_ES,':ob','LineWidth',2), title('Gov Curve
 on 11 AUG 2014 - Bloomberg'), ...
                     xlabel('Maturity in years'), ylabel('Yield in
 pct')

subplot(2,2,2), plot(tau_,y_ES,':ob','LineWidth',2), title('And,
 Svensson'), ...
hold on
plot(tau_,y_zero_SS,':*r','LineWidth',2), ...
                      xlabel('Maturity in years'), ylabel('Yield in
 pct')

subplot(2,2,3), plot(tau_,y_ES,':ob','LineWidth',2), title('And,
 Nelson-Siegel')
hold on
plot(tau_,y_zero_NS,':*r','LineWidth',2), ...
                      xlabel('Maturity in years'), ylabel('Yield in
 pct')

subplot(2,2,4), plot(tau_,y_ES,':ob','LineWidth',2), title('And,
 Smoothing Spline')
hold on
plot(tau_,y_zero_SmSpline,':*r','LineWidth',2), ...
                      xlabel('Maturity in years'), ylabel('Yield in
 pct')

saveas(gcf,'AllZC.eps', 'psc2')
```



Now that all three models are estimated, it is easy to also compare their instantaneous forward rate curves. First, the forward rates are extracted from the structured variables that hold the model results, and then the curves are plotted in Figure 5.

```
forward_SS       = est_Svensson.getForwardRates(tau_m).*100;
forward_NS       = est_NS.getForwardRates(tau_m).*100;
forward_SmSpline = est_SmSpline.getForwardRates(tau_m).*100;

figure
plot(tau_,[forward_SS forward_NS forward_SmSpline]), ...%
 title('Instantenous Forward Rate Curves'), ...
                  legend('Svensson','Nelson-Siegel','Smoothing
 Spline','Location','SouthEast'), ...
                  xlabel('Maturity in years'), ylabel('Yield in pct')

saveas(gcf,'AllForwards.eps', 'psc2')
```



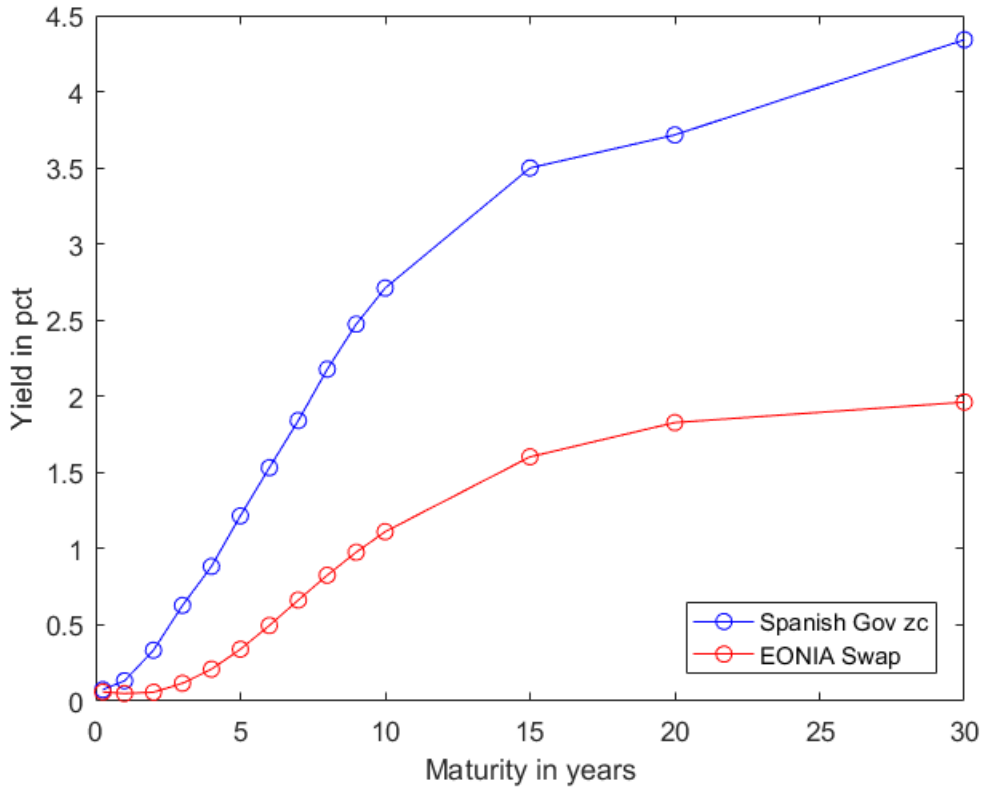
Fitting curves to observed yields

Yield curve data is often directly available, and it may therefore not be necessary to apply estimation techniques to the bond data (prices, coupons, and maturity dates) to uncover the curves, as it was done in the above section. Instead, it is possible to work directly with the observed yields to fit models that allow for the calculation of forward rate curves, and to facilitate interpolation and extrapolation to maturities that are not covered by the observed data.

Two types of yield curve data are used in the example. One is the zero coupon data for Spanish Government curve observed on 11 August 2014, which is also used in the above example. The second data set comprises observations on the EONIA 3 months swap curve (Bloomberg code: EUSWE[X] CMPN Curncy). These data are shown in Figure 6.

```
y_ES     = [0.075; 0.133; 0.334; 0.628; 0.884; 1.216; 1.532; ...
             1.841; 2.178; 2.474; 2.711; 3.499; 3.716; 4.341];

y_Swap   = [ 0.060; 0.050; 0.058; 0.117; 0.209; 0.340; 0.496; ...
               0.663; 0.826; 0.977; 1.112; 1.603; 1.828; 1.962 ];

tau_     = [ 3; 12; 24; 36; 48; 60; 72; 84; 96; 108; 120; 180; 240;
 360]./12;
nTau     = length(tau_);

figure
plot(tau_,y_ES,'-ob')
hold on
```

```
plot(tau_,y_Swap,'-or'), ... % title('Figure 6: Yield Curves Observed
 on 11 AUG 2014'), ...
                    xlabel('Maturity in years'), ylabel('Yield in
 pct'), ...
                    legend('Spanish Gov zc', 'EONIA
 Swap', 'Location', 'SouthEast')
saveas(gcf,'SpainEonia.eps', 'psc2')
```

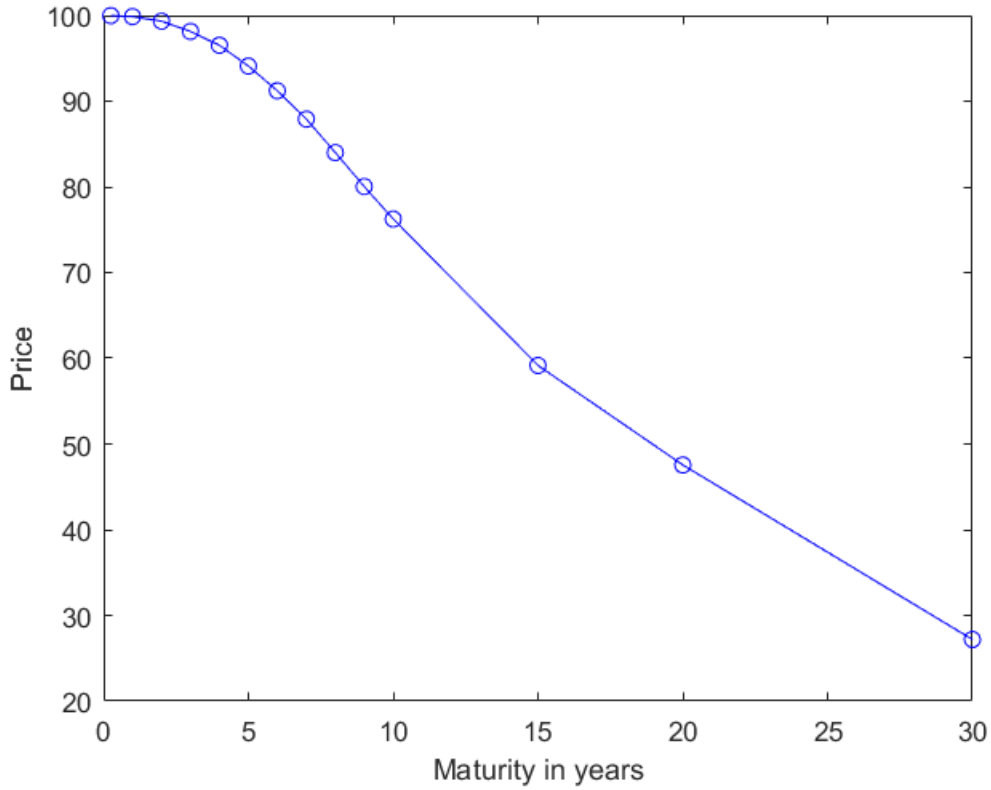


To fit the available models to the Spanish zero coupon curve data it is first necessary to construct the needed input. The settlement date is set equal to the date at which the curve is observed, and the maturities at which the curve points are observed, contained in the vector 'tau_', they need to be converted into corresponding 'dates'. This is done by defining the vector 'maturity_m', which takes the business day closest to the settlement date plus the appropriate numbers of days that correspond to the maturities contained in 'tau_'. It is assumed that there are 365 days in a year. Since zero coupon data is used, the coupon input variable 'cpn_m' is set equal to a vector of zeros, of appropriate length. Finally, the prices of the zero coupon 'instruments' are found as the discount factors for the observed yields. This is done using the built-in Matlab function 'zero2disc'.\footnote{The function 'zero2disc' requires two additional inputs: the type of compounding used (-1 corresponds to continous compounding) and the day count convention (8 corresponds to actual/actual).}

```
settle_m     = repmat(datenum(['11/08/2014'],'dd/mm/yyyy'), nTau,1);
maturity_m   = busdate( settle_m(1,1) + ceil(tau_.*365) );
cpn_m        = zeros(nTau,1);
price_m      = zero2disc(y_ES./100, maturity_m, settle_m, -1, 8).*100;

Instruments_ = [settle_m maturity_m price_m cpn_m ];
```

The obtained prices are plotted in Figure 7.

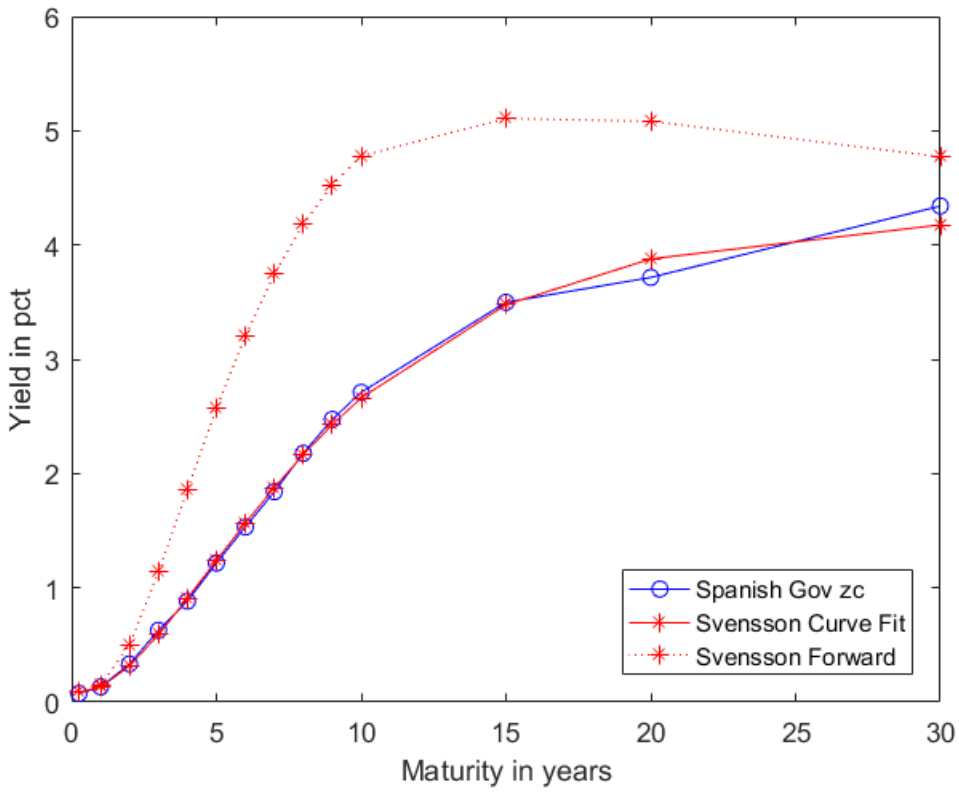
```
figure
plot(tau_, price_m,'-ob'), ... % title('Figure 7: Zero Coupon
 Prices'), ...
                        xlabel('Maturity in years'), ylabel('Price')
saveas(gcf,'SpainPrices.eps', 'psc2')
```



Once starting values ('b_S') and possible lower and upper bound parameter constraints (lb_S and ub_S) have been decided on, the chosen model can be estimated. Here, the Svensson model is used to fit the observed Spanish zero coupon curve. Results are shown in Figure 8.

```
b_S   = [ 4.00  -3.00  0.40  -0.50  3.50  1.50 ];
lb_S  = [ 0.00  -inf  -inf  -inf   0.00  0.00 ];
ub_S  = [ 25.0   inf   inf   inf    inf   inf ];

optOptions_  = optimset('TolFun', 1e-8, 'TolX', 1e-8, 'MaxFunEvals',
 1e12, ...
                        'MaxIter', 1e12, 'Display', 'none' );

fitOptions_ss  =
 IRFitOptions(b_S, 'FitType', 'durationweightedprice', ...
                                  'LowerBound', lb_S, 'UpperBound',
 ub_S, ...
                                  'OptOptions', optOptions_ );
```

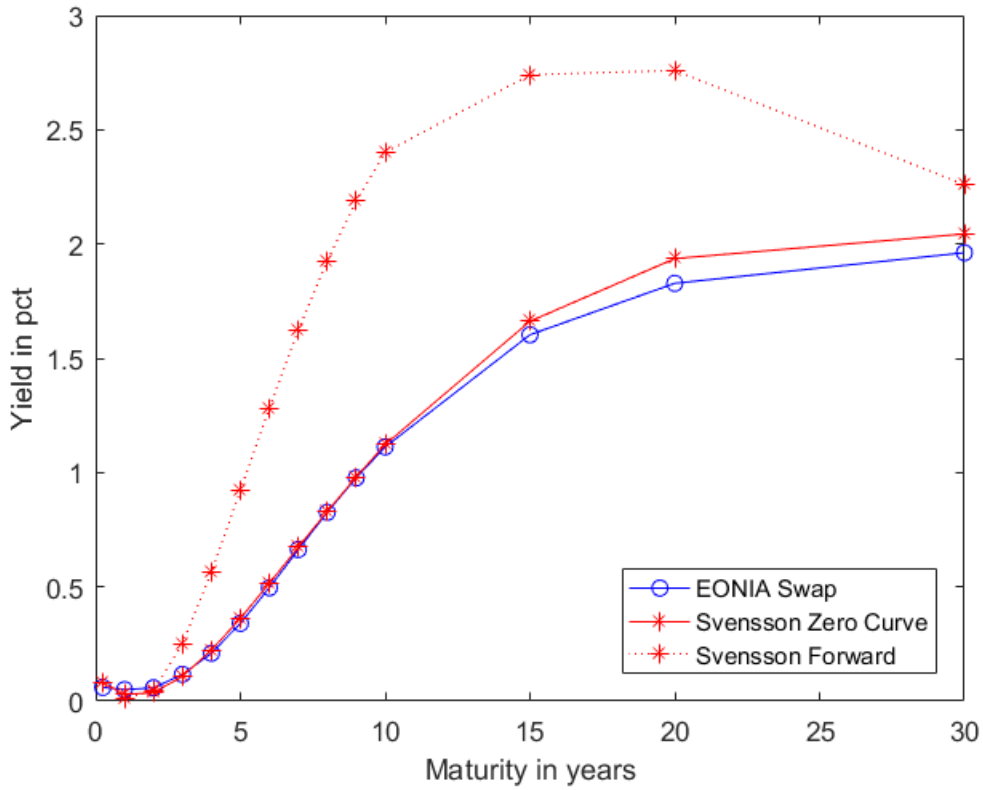
```
est_SvenssonES = IRFunctionCurve.fitSvensson('Zero', settle_(1,1),
 Instruments_, ...
                                                'Compounding',
 -1, ...
                                                'Basis', 8, ...
                                                'IRFitOptions',
 fitOptions_ss);

y_ES_SS   = est_SvenssonES.getZeroRates(maturity_m).*100;
fwd_ES_SS = est_SvenssonES.getForwardRates(maturity_m).*100;

figure
plot(tau_,y_ES,'-ob')
hold on
plot(tau_,y_ES_SS,'-*r'),
hold on
plot(tau_,fwd_ES_SS,':*r'), ...% title('Figure 8: Observed and Fitted
 Yield and Forward Curves'), ...
                     xlabel('Maturity in years'), ylabel('Yield in
 pct'), ...
                     legend('Spanish Gov zc', 'Svensson Curve
 Fit','Svensson Forward', 'Location', 'SouthEast')
saveas(gcf,'SpainSvensson.eps', 'psc2')
```



The second data set used is the EONIA swap curve, observed on 11 August 2014. These data are used to illustrate how a zero coupon curve can be extracted from swap data. It is important to emphasise that the

exercise does not aim to fit the observed data, rather the purpose is to extract the zero coupon curve from the data. Swap rates are not zero coupon rates, but more similar to coupon bonds. In particular, a swap is an arrangement between two parties to exchange a stream of future floating payment for a stream of future fixed payments. In the case of the EONIA swap the floating payment is constituted by the future EONIA rate, and the fixed payment is equal to the swap rate. In general, the value of a swap contract is equal to zero at the time it is initiated. This means that the observed swap curve, at a given point in time, in some sense represents market equilibrium rates, at that point in time, at which traders are willing to exchange fixed payments for future floating (EONIA) payments/rates. The market equilibrium consideration implies that the swap rate can be treated as a coupon payment on a newly issued par bond, i.e. a bond which price is 100. For this reason, the inputs to the swap rate estimation are as follows:

```
settle_swap   = repmat(datenum(['11/08/2014'],'dd/mm/yyyy'), nTau,1);
maturity_swap = busdate( settle_m(1,1) + ceil(tau_.*365) );
cpn_swap      = y_Swap./100;
price_swap    = 100.*ones(nTau,1);

Instruments_swap  = [settle_swap maturity_swap price_swap cpn_swap ];

est_Svensson_swap = IRFunctionCurve.fitSvensson('Zero', settle_(1,1),
 Instruments_swap, ...
                                                 'Compounding',
 -1, ...
                                                 'Basis', 8, ...
                                                 'IRFitOptions',
 fitOptions_ss);

y_swap_SS      = est_Svensson_swap.getZeroRates(maturity_m).*100;
fwd_swap_SS    = est_Svensson_swap.getForwardRates(maturity_m).*100;

figure
plot(tau_,y_Swap,'-ob')
hold on
plot(tau_,y_swap_SS,'-*r'),
hold on
plot(tau_,fwd_swap_SS,':*r'), ... %title('Figure 8: Observed and
 Fitted Yield and Forward Curves'), ...
                     xlabel('Maturity in years'), ylabel('Yield in
 pct'), ...
                     legend('EONIA Swap', 'Svensson Zero
 Curve','Svensson Forward', 'Location', 'SouthEast')
saveas(gcf,'fitEONIA.eps', 'psc2')
```



Summary

The objective of this note is to provide a brief and hands-on introduction to fitting of single dated (as opposed to panel data) yield curves using Matlab's Financial Instruments Toolbox. The toolbox contains three pre-programmed models, namely (i) Nelson-Siegel, (ii) Svensson (-Sodelind), and (iii) Smoothing Spline, and it facilitates the integration of user defined models, althogh this is not covered by the note. Using the three standard models, it is demonstrated how zero and forward curves can be extracted, on the basis of traded bonds, i.e. how information on bonds prices, coupons, coupon frequencies, maturities, day count conventions and compounding type, can be translated into zeros and forwards. It is also shown how to perform estimations using swap and zero coupon data.

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