1. Příloha: Hodnoty z Vlivu Λ

z [m]	b [m]	c_{l0} [-]	$c_{n\,b_{SAT}}$ [-]
0	0.962	0.01092	0.995334
0.051	0.956	0.01091	1.001027
0.103	0.95	0.01083	1.006031
0.154	0.944	0.01068	1.010593
0.205	0.938	0.01049	1.014766
0.256	0.932	0.01027	1.018603
0.308	0.926	0.01001	1.022175
0.359	0.92	0.00972	1.0255
0.41	0.914	0.00942	1.028576
0.461	0.908	0.00909	1.031476
0.511	0.902	0.00874	1.034164
0.562	0.896	0.00838	1.036692
0.613	0.89	0.008	1.039044
0.663	0.884	0.00761	1.041237
0.713	0.878	0.00722	1.043253
0.763	0.872	0.00681	1.045162
0.813	0.866	0.00639	1.046913
0.863	0.86	0.00596	1.048557
0.912	0.855	0.00553	1.050043
0.961	0.849	0.00509	1.051404
1.01	0.843	0.00465	1.052642
1.059	0.837	0.0042	1.053756
1.107	0.832	0.00375	1.054746
1.156	0.826	0.00329	1.05563
1.203	0.82	0.00283	1.05639
1.251	0.815	0.00237	1.057027
1.298	0.809	0.00191	1.057557
1.345	0.804	0.00145	1.057946
1.392	0.798	0.00099	1.058212
1.438	0.793	0.00053	1.058353
1.484	0.787	0.00008	1.058371
1.53	0.782	-0.00038	1.058265
1.575	0.777	-0.00084	1.058035
1.62	0.771	-0.00129	1.057664
1.664	0.766	-0.00174	1.057151
1.708	0.761	-0.00219	1.056514

1.752	0.756	-0.00263	1.055701
1.795	0.751	-0.00307	1.054764
1.837	0.746	-0.0035	1.053667
1.88	0.741	-0.00393	1.052412
1.921	0.736	-0.00435	1.05098
1.963	0.731	-0.00477	1.049406
2.004	0.726	-0.00518	1.04762
2.044	0.721	-0.00558	1.045657
2.084	0.717	-0.00597	1.0435
2.123	0.712	-0.00636	1.041148
2.162	0.707	-0.00674	1.038584
2.2	0.703	-0.00711	1.035791
2.238	0.698	-0.00747	1.032767
2.275	0.694	-0.00782	1.029496
2.312	0.69	-0.00816	1.025959
2.348	0.686	-0.0085	1.022193
2.383	0.681	-0.00881	1.018108
2.418	0.677	-0.00912	1.013741
2.452	0.673	-0.00942	1.009073
2.486	0.669	-0.0097	1.004051
2.519	0.665	-0.00997	0.998711
2.551	0.662	-0.01023	0.993
2.583	0.658	-0.01047	0.986899
2.614	0.654	-0.01069	0.980392
2.645	0.651	-0.01091	0.973496
2.675	0.647	-0.0111	0.966105
2.704	0.644	-0.01128	0.958272
2.732	0.64	-0.01144	0.949943
2.76	0.637	-0.01159	0.941085
2.787	0.634	-0.01171	0.931678
2.814	0.631	-0.01182	0.921687
2.84	0.628	-0.0119	0.911095
2.865	0.625	-0.01197	0.89985
2.889	0.622	-0.01201	0.887932
2.913	0.619	-0.01204	0.875324
2.936	0.616	-0.01204	0.861956
2.958	0.614	-0.01201	0.847811
2.979	0.611	-0.01197	0.832851
3	0.609	-0.01189	0.817008
3.02	0.606	-0.0118	0.800281
3.039	0.604	-0.01167	0.782616
3.058	0.602	-0.01152	0.763961
3.076	0.6	-0.01134	0.744281

3.093	0.598	-0.01114	0.723558
3.109	0.596	-0.0109	0.701702
3.124	0.594	-0.01063	0.678698
3.139	0.592	-0.01034	0.654526
3.153	0.591	-0.01001	0.629117
3.166	0.589	-0.00966	0.602452
3.179	0.588	-0.00927	0.574479
3.19	0.586	-0.00885	0.545197
3.201	0.585	-0.0084	0.514571
3.211	0.584	-0.00792	0.482566
3.22	0.583	-0.00741	0.4492
3.229	0.582	-0.00686	0.414436
3.236	0.581	-0.00629	0.378312
3.243	0.58	-0.00568	0.340808
3.249	0.579	-0.00505	0.301995
3.254	0.579	-0.00439	0.261892
3.259	0.578	-0.00371	0.220586
3.263	0.578	-0.003	0.178149
3.265	0.577	-0.00227	0.134703
3.267	0.577	-0.00152	0.090374
3.269	0.577	-0.00077	0.045408

2. Příloha: Matlab

```
clear, close, clc

format long

% hodnoty z práce Ing. Valenty

b_sat = 0.786; % m

l_h = 3.08; % m

x_ACwfu = 0.161; % /

c_M0wfu = -0.03697; % /

G_S = 585; % N/(m^2)

g = 9.80665; % m/(s^2)

ro = 1.225; % hustota, kg/(m^3)

kin_visk = 1.46*10^(-5); % m^2/s

S = 300*g/G_S; % m^2, pro 300kg (M)

% zvolení požadované konfigurace

m = input("Zvolte hmotnost (M/MTOM):", "s");

if m == "M"

        m = 300; % kg

        v = 114.6; % maximální m/s

        x_cg = 0.269; % %

elseif m == "MTOM"

        m = 345; % kg

        v = 28.71; % pádová bez klapek m/s

        x_cg = 0.272; % %

else

        disp("Neplatný vstup");

        return

end

% výpočet Reynoldsova čísla

Re = b_sat*v/kin_visk;
```

```
% výpočet součinitele celého letadla (silová rovnováha se vztlakem)
cL =(2*m*g)/(S*ro*v^2);
% výpočet součinitele křídla (Torenbeek)
cL_w=(cL-c_M0wfu*b_sat/l_h)/(1+(x_cg-x_ACwfu)*b_sat/l_h);
% zjištění součinitele na křídle ve vzdálenosti odpovídající b_sat
% matlab spline interpolace z dat v excelu od Ing. Valenty
% ve vzdálenosti od trupu odpovídající b_sat (lichoběžníkové křídlo)
cl_n_bsat = find_cl_n_bsat();
% výpočet součinitele profilu odpovídající b_sat
cl_0 = 0; % přibližně
cl = cl_0 + cl_n_bsat.*cL_w;
% zobrazení výsledku
disp(m);disp(Re);disp(cL);disp(cL_w);disp(cl);
function cl_n = find_cl_n_bsat()
% hodnoty z excelu, "Vliv V"
% vektor hodnot z
z = [0; 0.051; 0.103; 0.154; 0.205;  0.256; 0.308; 0.359; 0.41; 0.461; 0.511; 0.562; 0.613; 0.663; 0.713;
0.763;0.813;0.863;0.912;0.961;1.01;1.059;1.107;1.156;1.203;1.251;1.298;1.345;1.392;1.438;1.484;1.53;
1.575;1.62;1.664;1.708;1.752;1.795;1.837;1.88;1.921;1.963;2.004;2.044;2.084;2.123;2.162;2.2;2.238;2.2
75;2.312;2.348;2.383;2.418;2.452;2.486;2.519;2.551;2.583;2.614;2.645;2.675;2.704;2.732;2.76;2.787;2.
814;2.84;2.865;2.889;2.913;2.936;2.958;2.979;3;3.02;3.039;3.058;3.076;3.093;3.109;3.124;3.139;3.153;
3.166;3.179;3.19;3.201;3.211;3.22;3.229;3.236;3.243;3.249;3.254;3.259;3.263;3.265;3.267;3.269];
%vektor hodnot cl_n
cl_n = [0.995441816; 1.001132798; 1.006133991; 1.010693101; 1.014863116; 1.018697088;
1.022265685;1.025586724;1.028660137;1.031556661;1.034240995;1.036766053;1.039114218;1.04130
3245;1.043315377;1.045221351;1.046968114;1.048608716;1.050090255;1.051447875;1.052681648;1.
053791573;1.054777824;1.055657739;1.056413954;1.057046359;1.057572561;1.057957354;1.058218
168;1.058355348;1.058368534;1.058258018;1.058023737;1.057647756;1.057130487;1.056489371;1.0
55671354;1.054729569;1.053628651;1.05236843;1.050931473;1.049352896;1.04756213;1.045594543;
1.043432619;1.041075946;1.038506997;1.035708452;1.032679676;1.029403638;1.025862285;1.02209
1075;1.018001271;1.013628777;1.008955692;1.00392887;0.998583773;0.99286771;0.986762188;0.98
0249971;0.973349036;0.965952605;0.958114518;0.949780919;0.940917165;0.931505261;0.92150974
3;0.910913025;
```

```
0.899662054;0.887739148;0.875126522;0.861753542;0.847603012;0.832638595;0.816790438;0.800057644;0.782388176;0.763728374;0.744042975;0.723314294;0.701453911;0.678444145;0.654267205;0.628853023;0.602182797;0.574204498;0.5449172;0.514286472;0.482276479;0.448904906;0.414136279;0.37800618;0.340496711;0.301678717;0.261570486;0.220259127;0.177816693;0.134365867;0.090031443;0.045060388];

% interpolace cl_n v z = 1.4944 m (vzdálenost od trupu odpovídající b_sat)

cl_n = spline(z, cl_n, 1.4944);

end
```

3. Příloha: Seznam vybraných profilů

Čtyřčíselná řada NACA

0002	0004	0006	0008	0010	0012	0014	0016	0018	0020
1002	1004	1006	1008	1010	1012	1014	1016	1018	1020
1202	1204	1206	1208	1210	1212	1214	1216	1218	1220
1402	1404	1406	1408	1410	1412	1414	1416	1418	1420
1602	1604	1606	1608	1610	1612	1614	1616	1618	1620
1802	1804	1806	1808	1810	1812	1814	1816	1818	1820
2002	2004	2006	2008	2010	2012	2014	2016	2018	2020
2202	2204	2206	2208	2210	2212	2214	2216	2218	2220
2402	2404	2406	2408	2410	2412	2414	2416	2418	2420
2602	2604	2606	2608	2610	2612	2614	2616	2618	2620
2802	2804	2806	2808	2810	2812	2814	2816	2818	2820
3002	3004	3006	3008	3010	3012	3014	3016	3018	3020
3202	3204	3206	3208	3210	3212	3214	3216	3218	3220
3402	3404	3406	3408	3410	3412	3414	3416	3418	3420
3602	3604	3606	3608	3610	3612	3614	3616	3618	3620
3802	3804	3806	3808	3810	3812	3814	3816	3818	3820
4002	4004	4006	4008	4010	4012	4014	4016	4018	4020
4202	4204	4206	4208	4210	4212	4214	4216	4218	4220
4402	4404	4406	4408	4410	4412	4414	4416	4418	4420
4602	4604	4606	4608	4610	4612	4614	4616	4618	4620
4802	4804	4806	4808	4810	4812	4814	4816	4818	4820
5002	5004	5006	5008	5010	5012	5014	5016	5018	5020
5202	5204	5206	5208	5210	5212	5214	5216	5218	5220
5402	5404	5406	5408	5410	5412	5414	5416	5418	5420
5602	5604	5606	5608	5610	5612	5614	5616	5618	5620
5802	5804	5806	5808	5810	5812	5814	5816	5818	5820
6002	6004	6006	6008	6010	6012	6014	6016	6018	6020
6202	6204	6206	6208	6210	6212	6214	6216	6218	6220
6402	6404	6406	6408	6410	6412	6414	6416	6418	6420

6602	6604	6606	6608	6610	6612	6614	6616	6618	6620
6802	6804	6806	6808	6810	6812	6814	6816	6818	6820
7002	7004	7006	7008	7010	7012	7014	7016	7018	7020
7202	7204	7206	7208	7210	7212	7214	7216	7218	7220
7402	7404	7406	7408	7410	7412	7414	7416	7418	7420
7602	7604	7606	7608	7610	7612	7614	7616	7618	7620
7802	7804	7806	7808	7810	7812	7814	7816	7818	7820
8002	8004	8006	8008	8010	8012	8014	8016	8018	8020
8202	8204	8206	8208	8210	8212	8214	8216	8218	8220
8402	8404	8406	8408	8410	8412	8414	8416	8418	8420
8602	8604	8606	8608	8610	8612	8614	8616	8618	8620
8802	8804	8806	8808	8810	8812	8814	8816	8818	8820
9002	9004	9006	9008	9010	9012	9014	9016	9018	9020
9202	9204	9206	9208	9210	9212	9214	9216	9218	9220
9402	9404	9406	9408	9410	9412	9414	9416	9418	9420
9602	9604	9606	9608	9610	9612	9614	9616	9618	9620
9802	9804	9806	9808	9810	9812	9814	9816	9818	9820

Ostatní profily řad NACA

63-010A	64A-010	63_2A-215	747A315	23-012	23-015
23-018	63-012A	63-015A	63-210	63-212	63-215
63-412	63-415	64-008A	64-012A	64-108	64-110
64-215	66-021	63_2-615	63_3-018	64_1-212	64_1-212A
64_1-212B	64_2-015	64_2-015A	64_2-215	64_2-415	65_1-412
65_2-215	65_2-415	66_1-212	66_2-215		

Profily řady AG od M. Drely

03	08	10	12	14	17	19	24	26	35
37	44	45	46	47	53	55			

Profily řady Althaus (AH)

7	21	63	79	79k	80	81k	82	83	85
88	93	93k	93w	93w215	93w300	94	94w	95	80-140

Profily řady Eppler (E)

10	49	59	62	64	67	71	169	174	178
182	186	195	203	207	210	212	216	221	224
231	297	326	328	330	332	334	336	338	342
344	361	376	378	385	392	396	398	403	417
421	423	428	434	471	472	476	487	521	540
548	551	554	557	560	562	585	593	625	636
664	668	715	748	851	748	851	853	855	908

Profily řady Wortmann FX

61-168	63-137	66-17A-175	66-17AII-182	66-H-80	66-S-171
67-K-150/17	68-H-120	69-H-098	71-L-150/20	73-170	73-CL2-152
73-K-170/22	74-130 WP1	76-MP-120	77-W-153	77-080	84-W-097

Profily řady Gottingen (GOE)

6k	9k	12k	14	15k	54	63	114	118	121
133	140	143	144	165	174	176	184	210	225
228	234	240	256	265	274	280	286	290	304
314	324	344	358	366	375	385	394	405	415
424	434	456	464	474	484	494	504	514	523
534	535	553	564	574	585	595	604	614	624
633	645	655	675	685	693	704	711	723	735
744	758	766	775	780	795s	804			

4. Příloha: Python kód

Přepsání dat z XFLR do formátu JSON

```
import os, json

dir = r"foils\highRE"
big_dict = {}

for filename in os.listdir(dir):
    file = os.path.join(dir, filename)

    if os.path.isfile(file):
        f = open(file, "rt")
        obsah = f.readlines()

        contains_name = obsah[2]
        name_line = obsah[2].split()
        name_list = [name_line[-2], name_line[-1]]
        name = " ".join(name_list)

        alpha = []
        cl = []
        cd = []
        cm = []

        for i in range(11, len(obsah)):
            line = obsah[i].split()
            if line != []:
                alpha.append(float(line[0]))
                cl.append(float(line[1]))
                cd.append(float(line[2]))
                cm.append(float(line[4]))
            else:
                pass

        dictionary = {
            "alpha": alpha,
            "cl": cl,
            "cd": cd,
            "cm": cm
        }
        big_dict[name] = dictionary

jsonn = json.dumps(big_dict, indent=4)
with open(r"highRE.json", "w") as output:
    output.write(jsonn)
output.close()
```

Eliminace nevyhovujících profilů dle *low_tol* **a** *high_tol:*

```
import json
big_dict = {}
with open("lowRE.json") as low_file:
    low_foils = json.load(low_file)
    for low_name in low_foils:
        # nacte prislusne veci z json souboru pro nizsi hodnotu Reynoldse
        low_foil_dict = low_foils[low_name]
        low_alpha = low_foil_dict["alpha"]
        low_cl = low_foil_dict["cl"]
        low_cd = low_foil_dict["cd"]
        # maximalni pozadovany koeficient vztlaku a dovolena odchylka
        cl_max = 1.38116420
        low_tol = 0.2
        try:
            max_low_cl = max(low_cl)
        except:
            print(low_name)
            break
        low_dif = abs(cl_max - max_low_cl)
        if low_dif > low_tol:
            continue
        else:
        # pokud je koeficient vztlaku dostacujici, nacte json soubor s
      hodnotami pro vyssiho Reynoldse
            with open("highRE.json") as hihg_file:
                hihg_foils = json.load(high_file)
                for high_name in high_foils:
        # nacte prislusne veci z json souboru pro vyssi hodnotu Reynoldsova
cisla
                    high_foil_dict = high_foils[low_name]
                    high_alpha = high_foil_dict["alpha"]
                    high_cl = high_foil_dict["cl"]
                    high_cd = high_foil_dict["cd"]
                    high_cm = high_foil_dict["cm"]
        # koeficient vztlaku, pro ktery ma byt cd a cm minimalni a dovolena
      odchylka
                    cl_min_cd = 0.08462112
                    high_tol = 0.01
                    pre_high_dif = float("inf")
                    for cl_val in low_cl:
                        low_dif = abs(cl_min_cd - cl_val)
                        if low_dif > low_tol:
                            continue
                        else:
```

```
                # pokud se jedna o profil, ktery ma dostacujici maximalni hodnotu cl,
            najde hodnotu cd a cm pro cl ~= 0.08462112 (odchylka dle high_tol)
                            if low_name != high_name:
                                continue
                            else:
                # zajistuje nejmensi nalezenou hodnotu z vhodnych koeficientu (vhodne =
            vejdou se do tolerance high_tol)
                                if high_dif < pre_high_dif:
                                    int_index = high_cl.index(cl_val)

                                    # urceni cm a cd
                                    cm = high_cm[int_index]
                                    cd = high_cd[int_index]

                                    # dulezite veci do slovniku pro ukladani
                                    big_dict[high_name] = {
                                        "cl_max": max_low_cl,
                                        "cd": cd,
                                        "tolerance_cl_max": low_dif,
                                        "tolerance_cd": high_dif,
                                        "cm": cm
                                    }
                                    pre_high_dif = high_dif
                                else:
                                    continue

                    high_file.close()

        low_file.close()

        jsonn = json.dumps(big_dict, indent=4)
        with open(r"foils.json", "w") as output:
            output.write(jsonn)
        output.close()
```

5. Příloha: Bodování profilů

Název	Body od $c_{d\,p}$	Body od $c_{m\,p}$	Body od $c_{l\,p\,max}$	Body od odchylky od $c_{l\,p} = 0{,}085$	Součet
NACA 0010	485,000	10,000	4,273,580	52,112	4,820,692
NACA 1010	485,000	770,000	6,473,580	7,888	7,736,468
NACA 1208	499,000	1,790,000	1,343,580	22,112	3,654,692
NACA 1408	470,000	2,640,000	2,206,420	42,112	5,358,532
NACA 1608	448,000	3,700,000	2,336,420	7,888	6,492,308
NACA 1808	445,000	5,540,000	33,580	12,112	6,030,692
NACA 2010	482,000	1,530,000	8,633,580	42,112	10,687,692
NACA 2408	498,000	5,250,000	9,023,580	37,888	14,809,468
NACA 2608	432,000	7,420,000	9,253,580	12,112	17,117,692
NACA 3008	455,000	2,310,000	8,346,420	42,112	11,153,532
NACA 3206	614,000	5,320,000	613,580	32,112	6,579,692
NACA 4008	455,000	3,060,000	5,726,420	107,888	9,349,308
NACA 4206	2,246,000	7,180,000	6,293,580	112,112	15,831,692
NACA 4406	517,000	10,390,000	4,373,580	22,112	15,302,692
NACA 4606	474,000	14,590,000	1,466,420	37,888	16,568,308
NACA 4806	521,000	21,520,000	3,743,580	32,112	25,816,692
NACA 5204	3,910,000	7,630,000	1,606,420	22,112	13,168,532
NACA 5206	3,913,000	7,960,000	503,580	2,112	12,378,692
NACA 5402	974,000	6,970,000	7,206,420	7,888	15,158,308
NACA 5602	3,702,000	13,900,000	2,566,420	2,112	20,170,532
NACA 5804	3,261,000	13,610,000	7,176,420	12,112	24,059,532
NACA 6008	454,000	4,570,000	9,146,420	2,112	14,172,532
NACA 6404	4,188,000	11,480,000	623,580	57,888	16,349,468
NACA 6406	3,972,000	12,270,000	9,753,580	57,888	26,053,468
NACA 6602	4,707,000	13,800,000	6,106,420	77,888	24,691,308

NACA 6604	763,000	21,060,000	666,420	12,112	22,501,532
NACA 6802	6,129,000	17,820,000	413,580	2,112	24,364,692
NACA 7008	455,000	5,320,000	5,876,420	47,888	11,699,308
NACA 7402	5,292,000	10,490,000	1,633,580	22,112	17,437,692
NACA 7604	5,663,000	14,320,000	423,580	2,112	20,408,692
NACA 8008	464,000	6,050,000	4,003,580	47,888	10,565,468
NACA 9008	469,000	6,780,000	6,293,580	7,888	13,550,468
NACA 63(3)-018	449,000	120,000	6,420	42,112	617,532
NACA 64(1)-212	403,000	4,090,000	323,580	32,112	4,848,692
AG12	513,000	4,630,000	6,420	27,888	5,177,308
AG17	505,000	5,210,000	526,420	12,112	6,253,532
AG19	516,000	5,390,000	1,216,420	52,112	7,174,532
AH 63-K-127/24	582,000	10,150,000	376,420	2,112	11,110,532
AH 93-156	581,000	7,970,000	986,420	42,112	9,579,532
AH 93-K-131/15	538,000	1,720,000	1,193,580	57,888	3,509,468
AVISTAR	655,000	3,010,000	63,580	37,888	3,766,468
E 169	521,000	20,000	1,156,420	7,888	1,705,308
E 203	525,000	8,360,000	283,580	52,112	9,220,692
E 207	555,000	5,000,000	416,420	27,888	5,999,308
E 636	659,000	1,660,000	603,580	2,112	2,924,692
E 853	549,000	11,780,000	176,420	2,112	12,507,532
GOE 415	633,000	6,280,000	396,420	52,112	7,361,532
GOE 494	517,000	14,860,000	853,580	7,888	16,238,468
GOE 595	542,000	7,990,000	6,420	27,888	8,566,308
GOE 795 Smoothed	500,000	6,100,000	673,580	52,112	7,325,692
LWK 79-100	452,000	20,000	273,580	52,112	797,692
NREL's S813	465,000	7,620,000	596,420	52,112	8,733,532
NACA 66(2)-215	360,000	4,190,000	11,076,420	42,112	15,668,532

6. Příloha: Souřadnice profilu JS-24

x	y
0	0
4.26E-05	0.000979
7.06E-05	-0.00102
0.000207	0.001995
0.000248	-0.00203
0.000497	0.003061
0.000517	-0.00302
0.000865	-0.00399
0.000888	0.004118
0.001282	-0.00494
0.001354	0.005153
0.001762	-0.00587
0.001878	0.006164
0.002296	-0.00678
0.00245	0.007152
0.002875	-0.00766
0.003061	0.008122
0.003493	-0.00854
0.003701	0.009067
0.004145	-0.0094
0.004363	0.009993
0.004827	-0.01025
0.005043	0.010905
0.005537	-0.01108
0.005737	0.011801
0.00627	-0.01189
0.006449	0.012684
0.007026	-0.01269
0.007169	0.013545
0.007803	-0.01347
0.007904	0.01439
0.008598	-0.01424
0.008652	0.015219
0.009412	-0.015
0.009415	0.016032
0.01019	0.016827
0.010242	-0.01573
0.010979	0.017605
0.011087	-0.01645
0.01178	0.018365

x	y
0.011946	-0.01716
0.012595	0.019108
0.012815	-0.01785
0.013422	0.019833
0.013697	-0.01852
0.014261	0.020541
0.014593	-0.01918
0.015112	0.021231
0.015499	-0.01982
0.015974	0.021904
0.016417	-0.02045
0.016853	0.022563
0.017341	-0.02106
0.017739	0.023205
0.018274	-0.02166
0.018636	0.023831
0.019213	-0.02224
0.019539	0.024441
0.020158	-0.02281
0.020451	0.025037
0.021115	-0.02337
0.021375	0.025622
0.022075	-0.02392
0.022303	0.026193
0.023038	-0.02446
0.023237	0.026752
0.024006	-0.02499
0.024176	0.027299
0.024977	-0.0255
0.025122	0.027836
0.025952	-0.02601
0.026076	0.028365
0.026929	-0.02651
0.027033	0.028883
0.027907	-0.027
0.027995	0.029392
0.028889	-0.02748
0.028966	0.029895
0.029873	-0.02796
0.029937	0.030388

x	y
0.030857	-0.02843
0.030912	0.030874
0.031844	-0.02889
0.031894	0.031355
0.032835	-0.02935
0.032877	0.031828
0.033822	-0.0298
0.033863	0.032295
0.034811	-0.03024
0.034854	0.032758
0.035809	-0.03068
0.035846	0.033213
0.03681	-0.03112
0.036842	0.033663
0.037806	-0.03156
0.037842	0.034108
0.038804	-0.03198
0.038849	0.034549
0.039816	-0.03241
0.039855	0.034983
0.040818	-0.03283
0.040866	0.035413
0.041809	-0.03324
0.041889	0.035841
0.042819	-0.03365
0.04291	0.036263
0.043828	-0.03406
0.043927	0.036677
0.044827	-0.03446
0.044956	0.03709
0.045826	-0.03486
0.046001	0.037504
0.046838	-0.03525
0.047041	0.037909
0.047848	-0.03564
0.048073	0.038307
0.048845	-0.03603
0.049123	0.038705
0.049847	-0.03641
0.050184	0.039102

x	y
0.050854	-0.03679
0.051236	0.039491
0.051854	-0.03716
0.05229	0.039875
0.052847	-0.03752
0.053371	0.040263
0.053845	-0.03788
0.054446	0.040645
0.054848	-0.03825
0.055503	0.041015
0.055848	-0.0386
0.056563	0.041381
0.056843	-0.03895
0.057645	0.04175
0.05784	-0.0393
0.058723	0.042114
0.058838	-0.03965
0.059784	0.042467
0.059832	-0.03999
0.060826	-0.04032
0.060845	0.042816
0.061823	-0.04066
0.061921	0.043166
0.062823	-0.04099
0.063003	0.043513
0.063823	-0.04132
0.064074	0.043852
0.064819	-0.04165
0.065138	0.044185
0.065814	-0.04197
0.066212	0.044518
0.066814	-0.04229
0.067293	0.044849
0.067833	-0.04261
0.068368	0.045174
0.068853	-0.04293
0.069437	0.045494
0.069859	-0.04324
0.070509	0.045812
0.070858	-0.04355
0.071586	0.046127
0.071879	-0.04386

x	y
0.072661	0.046438
0.072921	-0.04418
0.073736	0.046746
0.073966	-0.04449
0.074814	0.047051
0.074998	-0.04479
0.075893	0.047354
0.076013	-0.04509
0.076976	0.047654
0.077047	-0.04539
0.078056	0.04795
0.078108	-0.04569
0.079134	0.048243
0.079177	-0.046
0.080213	0.048533
0.080236	-0.0463
0.081277	-0.04659
0.081303	0.048822
0.082321	-0.04687
0.082405	0.049112
0.083401	-0.04717
0.083507	0.049399
0.084502	-0.04747
0.0846	0.049681
0.08559	-0.04776
0.085686	0.049958
0.086655	-0.04804
0.086784	0.050235
0.087709	-0.04832
0.087909	0.050516
0.08879	-0.0486
0.089042	0.050797
0.089898	-0.04888
0.090168	0.051072
0.090996	-0.04916
0.091273	0.05134
0.092078	-0.04943
0.092373	0.051604
0.093137	-0.0497
0.093497	0.051872
0.094209	-0.04996
0.094643	0.052142

x	y
0.095315	-0.05023
0.095795	0.05241
0.096436	-0.05051
0.09694	0.052675
0.097529	-0.05077
0.098064	0.052932
0.098597	-0.05102
0.099182	0.053185
0.099656	-0.05127
0.100331	0.053443
0.10074	-0.05152
0.10151	0.053706
0.101839	-0.05178
0.102685	0.053964
0.102933	-0.05203
0.103842	0.054217
0.104009	-0.05227
0.104975	0.054462
0.105061	-0.05251
0.106107	0.054705
0.106112	-0.05274
0.107189	-0.05298
0.10727	0.054952
0.108277	-0.05322
0.10847	0.055204
0.109357	-0.05345
0.109668	0.055454
0.110417	-0.05368
0.110835	0.055695
0.111454	-0.0539
0.111972	0.055927
0.112484	-0.05412
0.113098	0.056156
0.113532	-0.05434
0.114248	0.056387
0.114592	-0.05456
0.115423	0.056621
0.115651	-0.05477
0.116596	0.056852
0.116697	-0.05499
0.117725	-0.05519
0.117756	0.057079

x	y
0.118742	-0.0554
0.118893	0.0573
0.119765	-0.0556
0.120013	0.057515
0.120803	-0.0558
0.121145	0.057731
0.121844	-0.05601
0.122308	0.05795
0.122878	-0.05621
0.123475	0.058169
0.123901	-0.0564
0.124629	0.058382
0.124919	-0.05659
0.125763	0.058591
0.125935	-0.05678
0.126872	0.058793
0.126952	-0.05697
0.127972	0.058991
0.127975	-0.05716
0.128998	-0.05735
0.129096	0.059193
0.130019	-0.05754
0.130246	0.059397
0.131038	-0.05772
0.131389	0.059598
0.132055	-0.0579
0.132517	0.059794
0.133074	-0.05808
0.133624	0.059985
0.134093	-0.05826
0.134713	0.060172
0.135113	-0.05844
0.135797	0.060356
0.136138	-0.05861
0.136891	0.06054
0.13717	-0.05879
0.137997	0.060724
0.138203	-0.05896
0.139108	0.060908
0.139233	-0.05914
0.140212	0.061088
0.140258	-0.05931

x	y
0.141279	-0.05947
0.141304	0.061266
0.1423	-0.05964
0.142388	0.06144
0.143321	-0.0598
0.14347	0.061613
0.144343	-0.05997
0.144552	0.061783
0.145378	-0.06013
0.145637	0.061953
0.146425	-0.0603
0.146725	0.062122
0.147477	-0.06046
0.147812	0.062289
0.148531	-0.06062
0.148896	0.062454
0.149579	-0.06078
0.149976	0.062617
0.150616	-0.06094
0.151057	0.062778
0.151642	-0.06109
0.152137	0.062938
0.152666	-0.06124
0.153218	0.063096
0.15369	-0.06139
0.154299	0.063253
0.154727	-0.06154
0.155382	0.063409
0.155788	-0.0617
0.15647	0.063564
0.156858	-0.06185
0.157562	0.063718
0.157927	-0.062
0.158652	0.063869
0.158995	-0.06215
0.159735	0.064019
0.160058	-0.06229
0.160815	0.064167
0.161112	-0.06244
0.161894	0.064312
0.162154	-0.06258
0.162972	0.064457

x	y
0.163185	-0.06272
0.16405	0.0646
0.164211	-0.06285
0.165128	0.064741
0.165246	-0.06299
0.166209	0.064881
0.166302	-0.06312
0.167299	0.065021
0.167382	-0.06326
0.168396	0.06516
0.168472	-0.0634
0.169495	0.065298
0.169547	-0.06353
0.170592	0.065434
0.170617	-0.06366
0.171681	-0.06379
0.171681	0.065567
0.172734	-0.06392
0.172764	0.065698
0.173773	-0.06404
0.173841	0.065827
0.174804	-0.06417
0.174918	0.065955
0.175832	-0.06429
0.175995	0.066081
0.176862	-0.0644
0.177072	0.066206
0.177906	-0.06452
0.17815	0.066329
0.178963	-0.06464
0.179238	0.066452
0.180023	-0.06476
0.180332	0.066574
0.181084	-0.06487
0.18143	0.066694
0.182145	-0.06499
0.182527	0.066814
0.183201	-0.0651
0.183619	0.066931
0.184249	-0.06521
0.184703	0.067046
0.185285	-0.06532

x	y
0.18578	0.067159
0.186316	-0.06543
0.186856	0.06727
0.187346	-0.06553
0.187932	0.067379
0.188376	-0.06563
0.189009	0.067488
0.189406	-0.06573
0.190085	0.067595
0.190437	-0.06584
0.191162	0.0677
0.19147	-0.06593
0.192239	0.067804
0.192509	-0.06603
0.193321	0.067908
0.193552	-0.06613
0.194407	0.06801
0.194596	-0.06623
0.195494	0.068111
0.195636	-0.06632
0.196578	0.06821
0.196672	-0.06642
0.197657	0.068307
0.1977	-0.06651
0.198708	-0.0666
0.198731	0.068403
0.199683	-0.06668
0.199785	0.068495
0.200804	0.068583
0.206991	-0.06727
0.209001	0.069244
0.214332	-0.0678
0.217227	0.069829
0.221637	-0.06827
0.225412	0.070333
0.228968	-0.06868
0.233633	0.070761
0.23631	-0.06903
0.24188	0.071111
0.243677	-0.06931
0.250093	0.07138
0.250998	-0.06952

x	y
0.258289	0.071568
0.258317	-0.06967
0.265638	-0.06977
0.266488	0.071677
0.272961	-0.06979
0.274689	0.071705
0.280284	-0.06974
0.282892	0.071643
0.287607	-0.06964
0.291093	0.071501
0.294929	-0.06947
0.299294	0.071283
0.302264	-0.06925
0.307544	0.070987
0.309644	-0.06895
0.315778	0.070616
0.316991	-0.06859
0.323996	0.070172
0.324322	-0.06818
0.33164	-0.06772
0.332187	0.06966
0.33899	-0.06721
0.340412	0.069077
0.346313	-0.06663
0.348598	0.068433
0.353641	-0.066
0.3568	0.067717
0.360966	-0.06533
0.364977	0.066944
0.368272	-0.06462
0.373165	0.066112
0.375593	-0.06386
0.381326	0.065225
0.382895	-0.06305
0.389505	0.064281
0.390199	-0.06219
0.3975	-0.06131
0.397665	0.063289
0.404786	-0.06038
0.405814	0.062249
0.412085	-0.05942
0.413968	0.061161

x	y
0.419365	-0.05842
0.42212	0.060028
0.426638	-0.05738
0.430257	0.058849
0.433921	-0.05632
0.438391	0.057629
0.44119	-0.05522
0.446521	0.056371
0.448455	-0.05409
0.454653	0.055076
0.45571	-0.05294
0.462782	0.053748
0.46297	-0.05175
0.470224	-0.05055
0.470906	0.052389
0.477467	-0.04932
0.479028	0.051003
0.48471	-0.04807
0.487147	0.04959
0.49195	-0.0468
0.495265	0.04815
0.499183	-0.04551
0.503378	0.046679
0.506418	-0.0442
0.511492	0.045192
0.513649	-0.04287
0.5196	0.043689
0.520877	-0.04154
0.52771	0.042163
0.528102	-0.04018
0.53532	-0.03882
0.535816	0.040627
0.542535	-0.03744
0.543923	0.03908
0.549751	-0.03605
0.552029	0.037514
0.556966	-0.03466
0.560134	0.035943
0.564178	-0.03326
0.568238	0.034366
0.571383	-0.03186
0.576343	0.032789

x	y
0.578591	-0.03045
0.584451	0.031212
0.585799	-0.02905
0.592565	0.029635
0.593011	-0.02765
0.600224	-0.02624
0.600684	0.028057
0.607439	-0.02484
0.608806	0.026487
0.614657	-0.02345
0.61693	0.024925
0.62188	-0.02207
0.625067	0.023382
0.629109	-0.02069
0.633214	0.021853
0.636343	-0.01934
0.641371	0.020337
0.643581	-0.01799
0.649538	0.018849

x	y
0.650826	-0.01667
0.657723	0.017384
0.658087	-0.01537
0.665354	-0.01409
0.66592	0.015948
0.672632	-0.01283
0.674132	0.014543
0.67993	-0.0116
0.682361	0.013173
0.687241	-0.0104
0.690611	0.011835
0.694557	-0.00924
0.698882	0.010533
0.701889	-0.0081
0.707179	0.009269
0.70924	-0.007
0.715487	0.008054
0.71661	-0.00594

x	y
0.723806	0.006906
0.723979	-0.00493
0.731371	-0.00399
0.73215	0.005828
0.738787	-0.0031
0.740519	0.00483
0.746188	-0.00229
0.74888	0.003931
0.753618	-0.00156
0.757247	0.00314
0.761016	-0.00093
0.765613	0.002458
0.768443	-0.00039
0.773974	0.001874
0.775848	8.21E-05
0.782273	0.001366
0.783208	0.000509
0.790563	0.000904