



GRADO EN (TITULACIÓN)

TRABAJO FIN DE GRADO

2015 / 2016

MODELIZACIÓN TÉRMICA DEL PROCESO DE DIAMANTADO

DOCUMENTO 5: ANEXOS

DATOS DE LA ALUMNA O DEL ALUMNO

NOMBRE: JON

APELLIDOS: JAUREGUI CANO

FDO.:

FECHA: 14/04/2016

DATOS DEL DIRECTOR O DE LA DIRECTORA

NOMBRE: IÑIGO

APELLIDOS: POMBO RODILLA

DEPARTAMENTO: INGENIERÍA MECÁNICA

FDO.:

FECHA: 14/04/2016

Anexo II

DOCUMENTO 5: ANEXOS

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4.1. Código programación ANSYS

```

/BATCH
/COM,ANSYS RELEASE 15.0.7 UP20140420 10:53:10 03/02/2016
/input,menust,tmp,"
/GRA,POWER
/GST,ON
/PLO,INFO,3
/GRO,CURL,ON
/CPLANE,1
/REPLOT,RESIZE
WPSTYLE,,,,,,,,,0

!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

! Datos iniciales :
!""""""""""

*ASK,dc,Introduce la profundidad de pasada en um (Por defecto 15),15 ! El programa pregunta la
profundidad de pasada

*SET,ad,dc*(1E-6) ! ad : profundidad de pasada (en m)

*ASK,met,Seleccione un material para el soporte 1:acero 2:cobre (Por defecto 1),1 ! Tipo de
material utilizado

*ASK,vd,Introduce la velocidad de avance de la muela en mm/min (Por defecto 679),679
!Velocidad de avance de la muela

!-----
/PREP7
wprot,0,-90
CSYS,4

!(BASE)

K,1,0,0,0,
K,2,0.021,0,0,
K,3,0.023,0,0.002,
K,4,0.023,0,0.006,
K,5,0.021,0,0.008,
K,6,0.009,0,0.008,
K,7,0.009,0,0.004,
K,8,0,0,0.004,
A,1,2,3,4,5,6,7,8
VEXT,1,,0,0.02,0,,

!(TAPA)

K,17,0,0,0.0043,
K,18,0,0,0.0058,
K,19,0.00144,0,0.0083,
K,20,0.009,0,0.0083,
K,21,0.009,0,0.0043,
A,17,18,19,20,21
VEXT,11,,0,0.02,0,,
wpoff,0,0.0095,0.0043

```

CSYS,4
 K,27,0,0,0,
 K,28,0,0,0.0005
 K,29,0,0.0008,0.0005
 K,30,0,0.0008,0
 A,27,28,29,30
 VEXT,18,,0.0085,0,0,,

BTOL,1E-006 !(MODIFICACION DE TOLERANCIA)
 VSBV, 2, 3

!(DIAMANTE)

wpoff,-0.002,0,-0.0003
 CSYS,4
 K,35,0,0,0,
 K,36,0,0,0.0008,
 K,37,0,0.0008,0.0008,
 K,38,0,0.0008,0,
 A,35,36,37,38
 VEXT,13,,0.004,0,0,,

!DIVISION DEL DIAMANTE PARA MALLADO
 wprot,0,0,-90 !(GIRAR EL WP PARA DIVIDIR EL DIAMANTE USANDOLO)

wpoff,0,0,-0.00001 !(DIVISION DEL DIAMANTE A 10um)

VSBW,2,, !(DIVISION DEL DIAMANTE)

wpoff,0,0,-0.00001 !(SUPERFICIE SEPARACION MALLADO)
 VSBW,5,,
 wpoff,0,0,-0.00003 !(DIVISION DEL DIAMANTE A 30um)
 VSBW,2,,
 wpoff,0,0,-0.00001 !(SUPERFICIE DE SEPARACION)
 VSBW,5,,
 wpoff,0,0,-0.0018 !(DEJAR DOCE MICRAS DE SALIENTE PARA QUE EL MALLADO SEA MEJOR)
 VSBW,2,,
 KWPAVE, 7 !(MOVER EL WP PARA DIVIDIR LA BASE)
 VSBW,1,,

!GLUE VOLUMES
 FLST,2,9,6,ORDE,2
 FITEM,2,2
 FITEM,2,-10
 VGLUE,P51X
 ALLSEL,ALL !(REAGRUPAR LOS NUMEROS DE VOLUMEN)
 NUMCMP,VOLU

!-----

!MATERIALES

*IF,met,EQ,1,THEN

! Material 1 (ACERO)

MPTEMP,,,,,,,,

MPTEMP,1,0
MPDATA,DENS,1,,7800
MPTEMP,,,,,,,,
MPTEMP,1,0
MPDATA,EX,1,,210000000000
MPDATA,PRXY,1,,0.3
MPTEMP,,,,,,,,
MPTEMP,1,0
UIMP,1,REFT,,
MPDATA,ALPX,1,,1.0E-5
MPTEMP,,,,,,,,
MPTEMP,1,0
MPDATA,EMIS,1,,0.6
MPTEMP,,,,,,,,
MPTEMP,1,0
MPDATA,C,1,,460
MPTEMP,,,,,,,,
MPTEMP,1,27
MPTEMP,2,527
MPTEMP,3,727
MPTEMP,4,927
MPDATA,KXX,1,,54
MPDATA,KXX,1,,42
MPDATA,KXX,1,,32
MPDATA,KXX,1,,27

*ELSEIF,met,EQ,2

! Material 1 (COBRE)

MPTEMP,,,,,,,,
MPTEMP,1,0
MPDATA,DENS,1,,8960
MPTEMP,,,,,,,,
MPTEMP,1,0
MPDATA,EX,1,,128000000000
MPDATA,PRXY,1,,0.33
MPTEMP,,,,,,,,
MPTEMP,1,0
MPDATA,C,1,,389
MPTEMP,,,,,,,,
MPTEMP,1,0
MPDATA,EMIS,1,,0.65
MPTEMP,,,,,,,,
MPTEMP,1,27
MPTEMP,2,527
MPTEMP,3,727
MPTEMP,4,927
MPDATA,KXX,1,,400
MPDATA,KXX,1,,370
MPDATA,KXX,1,,355
MPDATA,KXX,1,,340

*ENDIF

! Material 2 (DIAMANTE)

```
MPTEMP,,,,,,,,
MPTEMP,1,0
MPDATA,DENS,2,,3502
MPTEMP,,,,,,,,
MPTEMP,1,0
MPDATA,EMIS,2,,0.2
MPTEMP,,,,,,,,
MPTEMP,1,27
MPTEMP,2,527
MPTEMP,3,727
MPTEMP,4,927
MPDATA,KXX,2,,2833
MPDATA,KXX,2,,917
MPDATA,KXX,2,,709
MPDATA,KXX,2,,575
MPTEMP,,,,,,,,
MPTEMP,1,27
MPTEMP,2,527
MPTEMP,3,727
MPTEMP,4,927
MPDATA,C,2,,533
MPDATA,C,2,,1648
MPDATA,C,2,,1786
MPDATA,C,2,,1748
```

!TIPO DE ELEMENTO

! TIPO DE ELEMENTO -> Thermal Mass -> Solid -> Brick 8nodes 70

```
ET,1,SOLID70 ! SE PUEDE CAMBIAR POR SOLID 185 SI SE NECESITA ANALISIS
ESTRUCTURAL
KEYOPT,1,2,2
KEYOPT,1,4,0
KEYOPT,1,7,0
KEYOPT,1,8,0
```

!-----

!MALLADO

!-----

!PARTES METALICAS (VOLUMENES 1, 7 Y 9)

!(MATERIAL 1) Y (SOLID70)

```
ALLSEL,ALL
VSEL,S,VOLU,,1,
VSEL,A,VOLU,,7,
VSEL,A,VOLU,,9,
VATT,1,,1,0
```

!DIAMANTE (VOLUMENES 2,3,4,5,6,8)

!(MATERIAL 2) Y (SOLID 70)

```
ALLSEL,ALL
VSEL,S,VOLU,,2,
```

```
VSEL,A,VOLU,,3,
VSEL,A,VOLU,,4,
VSEL,A,VOLU,,5,
VSEL,A,VOLU,,6,
VSEL,A,VOLU,,8,
VATT,2,,1,0
ALLSEL,ALL

!MALLADO SOPORTE
!*****
!BASE

! Base parte trasera (n° volumen :7)
! Smart size : 3

ALLSEL,ALL
SMRT,3
VSWEPT,7

! Base parte delantera (n° volumen :1)
! Smart size : 2

ALLSEL,ALL
SMRT,2
VSWEPT,1

!Tapa (n°volumen:9)
!*****

SMRT,OFF
MSHKEY,0
MSHAPE,1,3d
CM,_Y,VOLU
VSEL, , , , 9
CM,_Y1,VOLU
CHKMSH,'VOLU'
CMSEL,S,_Y

VMESH,_Y1

CMDELE,_Y
CMDELE,_Y1
CMDELE,_Y2

!MALLADO DIAMANTE
!*****

SMRT,OFF

!PRIMER VOLUMEN (n° volumen: 2) PRECISION 7um
!*****

!lineas paredes

FLST,5,8,4,ORDE,8
FITEM,5,35
FITEM,5,43
```



```

FITEM,5,54
FITEM,5,-55
FITEM,5,66
FITEM,5,68
FITEM,5,70
FITEM,5,-71
CM,_Y,LINE
LSEL, , , ,P51X
CM,_Y1,LINE
CMSEL,,_Y
LESIZE,_Y1, , ,80, , , ,1

```

!lineas esquinas

```

FLST,5,4,4,ORDE,4
FITEM,5,64
FITEM,5,-65
FITEM,5,67
FITEM,5,69
CM,_Y,LINE
LSEL, , , ,P51X
CM,_Y1,LINE
CMSEL,,_Y
LESIZE,_Y1, , ,10, , , ,1
!VSWEEP,2

```

!SEGUNDO VOLUMEN (Nº VOLUMEN: 4) precision 70um

```

!*****

```

!lineas paredes

```

FLST,5,8,4,ORDE,8
FITEM,5,62
FITEM,5,74
FITEM,5,76
FITEM,5,78
FITEM,5,-79
FITEM,5,84
FITEM,5,86
FITEM,5,-87
CM,_Y,LINE
LSEL, , , ,P51X
CM,_Y1,LINE
CMSEL,,_Y

```

```

LESIZE,_Y1, , ,16, , , ,1

```

!lineas esquinas

```

FLST,5,4,4,ORDE,2
FITEM,5,88
FITEM,5,-91
CM,_Y,LINE
LSEL, , , ,P51X
CM,_Y1,LINE
CMSEL,,_Y

```

```

LESIZE,_Y1, , ,3, , , ,1

```

VSWEEP,4

!Tercer volumen (nºvolumen: 6) precision ~= 250um Longitud 1.9388mm

!*****

!lineas paredes

FLST,5,8,4,ORDE,8

FITEM,5,63

FITEM,5,75

FITEM,5,87

FITEM,5,92

FITEM,5,94

FITEM,5,100

FITEM,5,102

FITEM,5,-103

CM,_Y,LINE

LSEL, , , ,P51X

CM,_Y1,LINE

CMSEL,_,_Y

LESIZE, _Y1, , ,8, , , ,1

!lineas esquinas

FLST,5,4,4,ORDE,2

FITEM,5,104

FITEM,5,-107

CM,_Y,LINE

LSEL, , , ,P51X

CM,_Y1,LINE

CMSEL,_,_Y

LESIZE, _Y1, , ,15, , , ,1

VSWEEP,6

!MALLADO CARAS DE CONEXION

!*****

!volumen entre 4 y 6 (nºvolumen:5)

MSHKEY,0

MSHAPE,1,3d

CM,_Y,VOLU

VSEL, , , , 5

CM,_Y1,VOLU

CHKMSH,'VOLU'

CMSEL,S,_Y

VMESH,_Y1

CMDELE,_Y

CMDELE,_Y1

CMDELE,_Y2

!volumen entre 2 y 4 (nºvolumen:3)

MSHKEY,0

MSHAPE,1,3d

```

CM,_Y,VOLU
VSEL, , , , 3
CM,_Y1,VOLU
CHKMSH,'VOLU'
CMSEL,S,_Y

```

```

VMESH,_Y1

```

```

CMDELE,_Y
CMDELE,_Y1
CMDELE,_Y2

```

!volumen final del diamante (nºvolumen: 8)

```

MSHKEY,0
MSHAPE,1,3d
CM,_Y,VOLU
VSEL, , , , 8
CM,_Y1,VOLU
CHKMSH,'VOLU'
CMSEL,S,_Y

```

```

VMESH,_Y1

```

```

CMDELE,_Y
CMDELE,_Y1
CMDELE,_Y2
VSWEEP,2

```

```

!-----
!-----

```

!Parametros termicos

*SET,Ti,20 !temperatura inicial diamantador

*SET,Te,20 !temperatura del ambiente

*SET,Tl,25 !temperatura lubricante

!hl=18745 !coeficiente conveccion taladrina (W/m².°C)

*SET,hl,5 !coeficiente conveccion aire (W/m².°C)

*SET,va,vd/1358 !ancho de la fuente de calor en mm

SET,sd,va(1E-3) !ancho de la fuente de calor en m

*ASK,Rd,Introduce el valor del coeficiente Rd (Por defecto 1),1

*ASK,W,Introduce la potencia consumida en W (Por defecto 100),100

*ASK,Ts,Introduce el tiempo de simulacion en segundos (Por defecto 1,8s),1.8

*SET,P,W*Rd !Potencia real, aplicado el coeficiente

```

!Pereferences ->thermal
/NOPR

```

```
KEYW,PR_SET,1
KEYW,PR_STRUC,0
KEYW,PR_THERM,1
KEYW,PR_FLUID,0
KEYW,PR_MULTI,0
```

```
! SOLUCION
```

```
! .....
```

```
FINISH
```

```
/SOL
ANTYPE,4
TRNOPT,FULL
NROPT,FULL
LUMPM,0
```

```
!temperatura inicial en todos los nodos
```

```
ALLSEL,ALL
IC,ALL,TEMP,Ti,
```

```
! conveccion en todas las areas menos en la de aplicacion del flujo de calor
```

```
ALLSEL,ALL
ASEL,s,AREA,,1,78,1
NSLA,R,1
SF,ALL,CONV,h1,T1
```

```
!flujo de calor
```

```
!POTENTZIA (W)
```

```
*SET,DENBORA,Ts !(segundos)
*SET,TPASOINC,0.1
```

```
!Bero iturriaren potentzia fluxua (W/m2)
```

```
*SET,Q,P/((0.0008*sd)+(ad*sd)+(ad*0.0008))
```

```
CSKP,11,0,36,52,35,1,1, !sistema de cordenadas en la punta del diamante
CSYS,11
```

```
!Seleccion del area superior de aplicacion del calor
```

```
NSEL,R,LOC,x,-0.000001,ad+0.0000005
NSEL,R,LOC,y,-0.000001,0.0008+0.000005
NSEL,R,LOC,z,-0.000001,sd+0.0000005
```

```
!Seleccion del area lateral de aplicacion del calor
```

```
!NSEL,R,LOC,x,-0.000001,ad+0.0000005
!NSEL,R,LOC,y,-0.000001,0.0008+0.000005
!NSEL,R,LOC,z,-0.000001,0.000001
```

```
SFDELE,ALL,CONV !eliminar conveccion en el area de aplicacion del flujo
SF,ALL,HFLUX,Q
```

ALLSEL,ALL

!solucion

TIME,1E-6 ! Tiempo al inicio del primer ciclo (cercano a 0)

AUTOTS,OFF ! autostepping desactivado

OUTRES,ERASE ! reiniciar parametros de solucion

OUTRES,ALL,ALL

SOLVE

*DO,t,TPASOINC,DENBORA,TPASOINC

TIME,t

AUTOTS,OFF

OUTRES,ERASE

OUTRES,ALL,ALL ! guarda los resultados obtenidos cada "td" para cada subpaso

SOLVE

*ENDDO

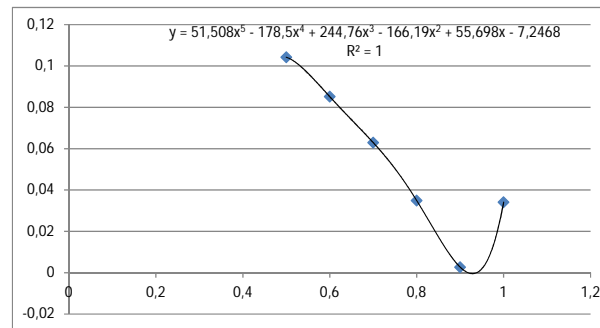
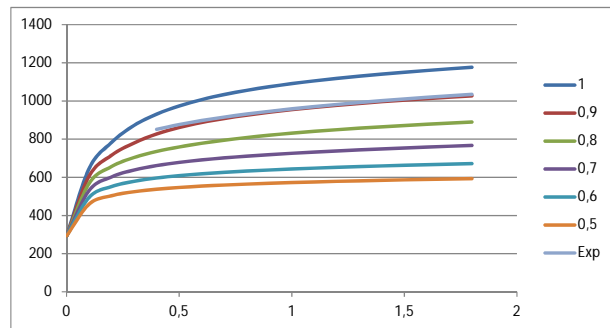
FINISH

4.2. Resultados completos

Grafico No.	Material del soporte	a_d [mm]	U_d	v_d [mm/min]
1	Acero	0.015	3	679
2		0.015	10	204
3		0.030	3	679
4		0.030	10	204
5	Cobre	0.015	3	679
6		0.015	10	204
7		0.030	3	679
8		0.030	10	204

t [s]	1	0,9	0,8	0,7	0,6	0,5
1E-06	20	20	20	20	20	20
0,1	373,067	333,528	295,264	258,103	221,927	186,626
0,2	510,456	442,903	383,718	329,339	278,584	230,726
0,3	599,418	507,466	431,139	365,541	306,346	251,787
0,4	658,341	554,217	462,687	388,608	323,657	264,771
0,5	701,13	588,235	486,338	405,245	335,968	273,951
0,6	734,316	614,347	505,41	418,217	345,471	281,013
0,7	761,014	635,329	521,539	428,881	353,219	286,757
0,8	783,055	652,908	535,671	437,978	359,779	291,611
0,9	801,777	668,251	547,724	445,951	365,489	295,826
1	818,062	681,485	558,507	453,075	370,559	299,561
1,1	832,48	693,48	567,963	459,542	375,13	302,923
1,2	845,452	704,317	576,67	465,485	379,303	305,985
1,3	857,187	714,125	584,608	470,999	383,149	308,803
1,4	867,883	723,321	591,869	476,154	386,725	311,417
1,5	877,79	731,938	598,721	481,01	390,072	313,86
1,6	887,038	739,802	605,188	485,617	393,225	316,157
1,7	895,695	747,173	611,12	490,006	396,211	318,328
1,8	903,763	754,199	616,778	494,201	399,051	320,389

1	0,9	0,8	0,7	0,6	0,5
293	293	293	293	293	293
646,067	606,528	568,264	531,103	494,927	459,626
783,456	715,903	656,718	602,339	551,584	503,726
872,418	780,466	704,139	638,541	579,346	524,787
931,341	827,217	735,687	661,608	596,657	537,771
974,13	861,235	759,338	678,245	608,968	546,951
1007,316	887,347	778,41	691,217	618,471	554,013
1034,014	908,329	794,539	701,881	626,219	559,757
1056,055	925,908	808,671	710,978	632,779	564,611
1074,777	941,251	820,724	718,951	638,489	568,826
1091,062	954,485	831,507	726,075	643,559	572,561
1105,48	966,48	840,963	732,542	648,13	575,923
1118,452	977,317	849,67	738,485	652,303	578,985
1130,187	987,125	857,608	743,999	656,149	581,803
1140,883	996,321	864,869	749,154	659,725	584,417
1150,79	1004,938	871,721	754,01	663,072	586,86
1160,038	1012,802	878,188	758,617	666,225	589,157
1168,695	1020,173	884,12	763,006	669,211	591,328
1176,763	1027,199	889,778	767,201	672,051	593,389



Datos experimentales directos		
0,355555556	354,1	627,1
0,411111111	475,5	748,5
0,466666667	529,5	802,5
0,522222222	571,6	844,6
0,577777778	599	872
0,633333333	621,1	894,1
0,688888889	654,5	927,5
0,744444444	666,6	939,6
0,8	677,4	950,4
0,855555556	685,1	958,1
0,911111111	691	964
0,966666667	694,1	967,1
1,022222222	700,9	973,9
1,077777778	706,8	979,8
1,133333333	710,2	983,2
1,188888889	706,8	979,8
1,244444444	708,8	981,8
1,3	716	989
1,355555556	724,9	997,9
1,411111111	729,8	1002,8
1,466666667	731,1	1004,1
1,522222222	736,4	1009,4
1,577777778	740,6	1013,6
1,633333333	744,1	1017,1
1,688888889	744,3	1017,3
1,744444444	741,3	1014,3
1,8	751,4	1024,4

EXP (ajust. R2>0,9)

851,6353	0,00876	0,0008221	0,01853624	0,04978802	0,08963946	0,13582403
876,6041	0,01238	0,00030739	0,01789527	0,05120324	0,09321429	0,14141889
897,5476	0,01496	0,00012916	0,01761906	0,05284602	0,09667894	0,14649608
915,6449	0,01671	6,3839E-05	0,0174935	0,05450228	0,0999127	0,15106795
931,6163	0,01784	3,7543E-05	0,01741604	0,05609027	0,10289526	0,1551924
945,935	0,01855	2,452E-05	0,01752115	0,05757951	0,10563678	0,15893196
958,93	0,01899	2,1487E-05	0,0176572	0,05896541	0,10816075	0,16234194
970,8391	0,01923	2,016E-05	0,01789633	0,06024805	0,11049125	0,16546843
981,8404	0,01936	2,1225E-05	0,01812117	0,06143276	0,11264905	0,16835132
992,0706	0,01938	2,4851E-05	0,01837036	0,06252719	0,11465438	0,17102093
1001,637	0,01933	2,8171E-05	0,01864446	0,06353958	0,11652214	0,17350415
1010,627	0,01923	3,1683E-05	0,01889113	0,06447451	0,11826729	0,17582151
1019,109	0,01912	3,8295E-05	0,01912087	0,06533507	0,11990076	0,17799104
1027,141	0,01899	4,602E-05	0,01938828	0,06612895	0,12143279	0,18002805
1034,772	0,01883	5,3562E-05	0,0196341	0,06686347	0,12287291	0,18194576
	0,0341	0,00272438	0,03490974	0,06294704	0,08519073	0,10425193

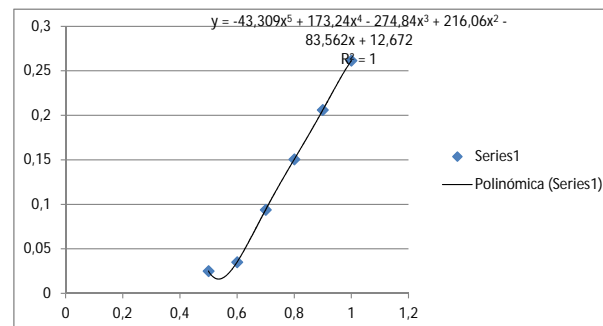
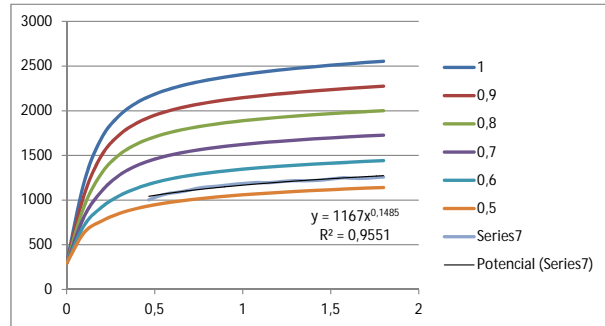
t [s]	1	0,9	0,8	0,7	0,6	0,5
1,00E-06	20	20	20	20	20	20
0,1	259,513	233,961	208,85	184,144	159,808	135,8
0,2	331,609	295,462	260,84	227,544	195,386	164,2
0,3	368,339	325,938	286,06	248,243	212,134	177,5
0,4	391,776	345,057	301,71	260,997	222,41	185,6
0,5	408,692	358,7	312,81	270,013	229,663	191,3
0,6	421,896	369,254	321,36	276,948	235,24	195,7
0,7	432,755	377,875	328,32	282,587	239,774	199,3
0,8	442,022	385,188	334,21	287,352	243,604	202,3
0,9	450,149	391,561	339,33	291,49	246,929	204,9
1	457,417	397,227	343,87	295,157	249,875	207,3
1,1	464,016	402,343	347,96	298,456	252,524	209,3
1,2	470,081	407,018	351,69	301,462	254,936	211,2
1,3	475,712	411,334	355,12	304,227	257,154	213
1,4	480,985	415,351	358,31	306,793	259,211	214,6
1,5	485,954	419,117	361,3	309,19	261,131	216,1
1,6	490,664	422,669	364,1	311,443	262,936	217,6
1,7	495,153	426,037	366,76	313,573	264,64	218,9
1,8	499,446	429,245	369,28	315,596	266,258	220,2
1,9	503,581	432,312	371,69	317,524	267,801	221,4
2	507,586	435,258	374	319,371	269,277	222,6
2,1	511,45	438,096	376,22	321,144	270,693	223,7
2,2	515,188	440,838	378,37	322,853	272,058	224,7
2,3	518,824	443,494	380,44	324,504	273,376	225,8
2,4	522,415	446,074	382,44	326,103	274,651	226,8
2,5	525,924	448,585	384,39	327,654	275,888	227,8
2,6	529,358	451,034	386,29	329,163	277,091	228,7
2,7	532,714	453,427	388,14	330,634	278,263	229,6
2,8	535,975	455,77	389,95	332,068	279,406	230,5
2,9	539,096	458,067	391,72	333,47	280,522	231,4
3	542,157	460,321	393,45	334,842	281,614	232,3
3,1	545,175	462,536	395,15	336,187	282,684	233,1
3,2	548,156	464,716	396,82	337,506	283,732	233,9
3,3	551,095	466,862	398,46	338,801	284,762	234,7
3,4	553,964	468,977	400,07	340,073	285,773	235,5
3,5	556,725	471,063	401,66	341,325	286,767	236,3
3,6	559,437	473,124	403,22	342,558	287,745	237,1
3,7	562,121	475,16	404,77	343,772	288,708	237,8
3,8	564,782	477,173	406,29	344,968	289,657	238,6
3,9	567,421	479,165	407,79	346,149	290,593	239,3
4	570,043	481,138	409,27	347,313	291,516	240
4,1	572,626	483,092	410,74	348,463	292,426	240,7
4,2	575,117	485,029	412,19	349,6	293,324	241,4
4,3	577,557	486,949	413,62	350,722	294,214	242,1
4,4	579,976	488,853	415,04	351,833	295,092	242,8
4,5	582,379	490,743	416,45	352,931	295,96	243,5
4,6	584,768	492,618	417,84	354,017	296,819	244,2
4,7	587,145	494,48	419,22	355,093	297,668	244,8
4,8	589,511	496,33	420,59	356,157	298,508	245,5
4,9	591,866	498,168	421,94	357,212	299,34	246,2
5	594,161	499,994	423,28	358,257	300,164	246,8
5,1	596,387	501,809	424,62	359,292	300,981	247,4
5,2	598,592	503,615	425,94	301,789	248,1	
5,3	600,785	505,416	427,25	302,591	248,7	
5,4	602,969	507,212	428,55	303,386	249,3	
5,5	605,145	509,029	429,85	304,174	249,9	
5,6	607,313	510,778	431,13	304,955	250,5	
5,7	609,476	512,546	432,41	305,73	251,1	
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1	829,015	730,417	670,227	616,865	568,157	522,875
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2,9	944,988	812,096	731,067	664,718	606,47	553,522
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3,4	966,567	826,964	741,977	673,071	613,073	558,773
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4	989,58	843,043	754,138	682,273	620,313	564,516
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5	1023,59	867,161	772,994	696,283	631,257	573,164
5,1	1026,65	869,387	774,809	697,615	632,292	573,981
5,2	1029,68	871,592	776,615	698,938	633,31	574,789
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5,4	1035,69	875,969	780,212	701,553	635,331	576,386
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5,6	1041,66	880,313	783,778	704,132	637,341	577,955
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0,4	1818,69	1590,33	1356,59	1114,48	861,245	633,632
0,5	1912,55	1676,45	1435,01	1185,67	922,897	674,222
0,6	1979,35	1737,08	1490,51	1235,94	968,546	705,554
0,7	2030,18	1782,56	1532,02	1273,78	1003,26	730,901
0,8	2070,52	1818,45	1565,07	1304,22	1030,71	752,198
0,9	2103,99	1848,07	1592,2	1328,84	1053,61	770,079
1	2132,71	1873,24	1615,1	1349,88	1072,93	785,867
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1,2	2180,34	1914,73	1652,11	1383,92	1104,8	812,108
1,3	2200,7	1932,58	1667,53	1398,19	1117,98	823,407
1,4	2219,36	1948,87	1681,53	1411,34	1130,02	833,785
1,5	2236,61	1963,79	1694,38	1423,33	1141,02	843,388
1,6	2252,68	1977,63	1706,27	1434,3	1151,31	852,33
1,7	2267,69	1990,57	1717,35	1444,44	1160,65	860,62
1,8	2281,83	2002,73	1727,74	1453,97	1169,42	868,344

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1206,973	1063,264	934,082	817,883	718,592	636,886
1699,87	1505,2	1305,2	1102,281	922,557	766,852
1947,33	1731,28	1509,23	1280,02	1049,12	850,67
2091,69	1863,33	1629,59	1387,48	1134,245	906,632
2185,55	1949,45	1708,01	1458,67	1195,897	947,222
2252,35	2010,08	1763,51	1508,94	1241,546	978,554
2303,18	2055,56	1805,02	1546,78	1276,26	1003,901
2343,52	2091,45	1838,07	1577,22	1303,71	1025,198
2376,99	2121,07	1865,2	1601,84	1326,61	1043,079
2405,71	2146,24	1888,1	1622,88	1345,93	1058,867
2430,88	2168,19	1907,8	1641,15	1362,88	1072,624
2453,34	2187,73	1925,11	1656,92	1377,8	1085,108
2473,7	2205,58	1940,53	1671,19	1390,98	1096,407
2492,36	2221,87	1954,53	1684,34	1403,02	1106,785
2509,61	2236,79	1967,38	1696,33	1414,02	1116,388
2525,68	2250,63	1979,27	1707,3	1424,31	1125,33
2540,69	2263,57	1990,35	1717,44	1433,65	1133,62
2554,83	2275,73	2000,74	1726,97	1442,42	1141,344



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1213,365	1,07892	0,66869602	0,35915599	0,14236926	0,02142775	0,0092913
1226,792	1,06421	0,65791937	0,35189135	0,13910154	0,02063522	0,00956908
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0.4	860.82	719.954	592.84	479.876	391.115	315.4
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0.7	1002.86	835.376	681.51	544.561	431.964	345.8
0.8	1030.39	859.804	700.95	559.411	441.201	350.1
0.9	1053.27	880.437	717.5	572.066	449.297	355.6
1	1072.67	898.328	732.23	583.326	456.537	360.5
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1.3	1117.62	940.924	767.6	610.674	474.763	372.5
1.4	1129.69	952.533	777.28	618.302	480.013	376
1.5	1140.83	963.016	786.16	625.512	484.96	379.2
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2	1185.53	1006.25	823.61	655.594	506.486	392.9
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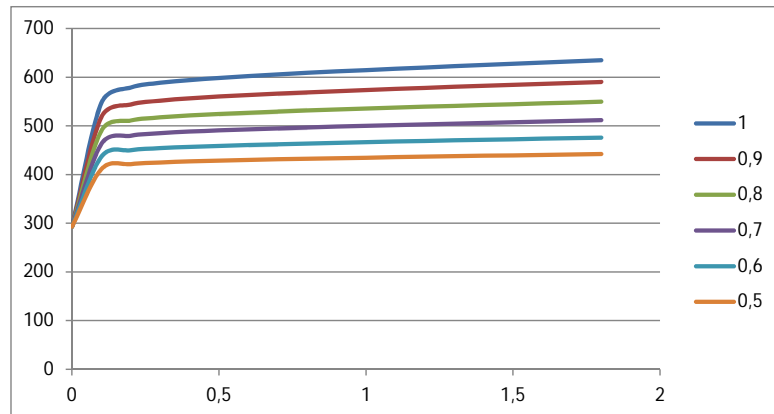
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0.3	1048.631	925.995	814.398	718.813	640.744	571.662
0.4	1133.82	992.954	865.837	752.876	664.115	588.354
0.5	1195.493	1041.806	902.811	778.798	680.98	600.208
0.6	1241.181	1078.971	931.352	799.955	694.353	614.8
0.7	1275.86	1108.376	954.512	817.561	704.964	616.802
0.8	1303.39	1132.804	973.952	832.411	714.201	623.108
0.9	1326.27	1153.437	990.504	845.066	722.297	628.593
1	1345.67	1171.328	1005.229	856.326	729.537	633.461
1.1	1362.68	1187.051	1018.227	866.258	736.115	637.949
1.2	1377.4	1201.049	1029.83	875.422	742.155	641.853
1.3	1390.62	1213.924	1040.6	883.674	747.763	645.542
1.4	1402.69	1225.533	1050.276	891.302	753.013	648.97
1.5	1413.83	1236.016	1059.163	898.512	757.96	652.178
1.6	1424.05	1245.821	1067.548	905.214	762.65	655.199
1.7	1433.41	1255.073	1075.475	911.438	767.118	658.058
1.8	1442.21	1263.755	1082.91	917.381	771.392	660.778
1.9	1450.57	1271.723	1089.944	923.106	775.503	663.376
2	1458.53	1279.25	1096.606	928.594	779.486	665.866
2.1	1466.16	1286.46	1102.971	933.66	783.325	668.261
2.2	1473.35	1293.27	1109.084	938.571	787.059	670.571
2.3	1480.09	1300.08	1114.953	943.354	790.671	672.807
2.4	1486.55	1306.49	1120.555	948.026	794.235	674.974
2.5	1492.77	1312.51	1126.948	952.604	797.727	677.081
2.6	1498.79	1318.23	1131.17	956.963	801.146	679.132
2.7	1504.63	1323.76	1135.244	961.137	804.491	681.133
2.8	1510.33	1329.15	1141.186	965.22	807.722	683.089
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3.1	1526.35	1344.62	1155.352	977.085	816.9	688.715
3.2	1531.29	1349.58	1159.827	980.921	819.864	690.522
3.3	1536.15	1354.35	1164.203	984.605	822.792	692.298
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3.5	1545.64	1363.36	1172.712	991.687	828.453	695.771
3.6	1550.26	1367.73	1176.855	995.162	831.155	697.469
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3.8	1559.28	1376.25	1185.002	1002.014	836.472	700.799
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4	1568.06	1384.55	1192.992	1008.737	841.703	704.048
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4.4	1584.08	1400.46	1208.188	1021.24	851.657	710.335
4.5	1587.96	1404.18	1211.864	1024.252	854.048	711.868
4.6	1591.78	1407.84	1215.494	1027.245	856.424	713.387
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4.8	1599.36	1414.99	1222.555	1033.158	861.141	716.385
4.9	1603.08	1418.51	1225.686	1036.063	863.484	717.866
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5.4	1621.1	1436.33	1242.09	1049.991	874.601	725.106
5.5	1624.54	1438.64	1245.269	1052.676	876.765	726.524
5.6	1627.92	1441.93	1248.419	1055.334	878.922	727.934
5.7	1631.25	1445.13	1251.537	1057.968	881.073	729.335
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0,9	338,806	298,232	260,648	225,434	192,168	160,533
1	341,62	300,579	262,607	227,059	193,498	161,598
1,1	344,324	302,832	264,487	228,617	194,774	162,619
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1,3	349,494	307,133	268,073	231,589	197,205	164,564
1,4	351,992	309,208	269,801	233,02	198,376	165,501
1,5	354,449	311,246	271,498	234,424	199,524	166,419
1,6	356,874	313,255	273,169	235,807	200,654	167,323
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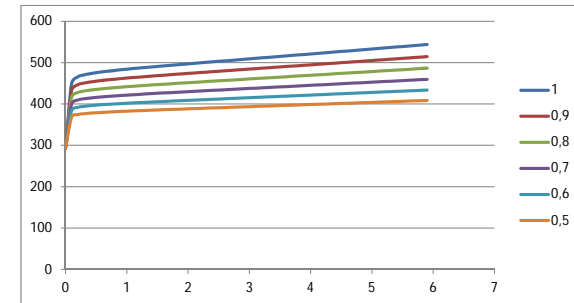
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598,525	560,138	524,377	490,739	458,867	428,488
602,308	563,299	527,019	492,932	460,662	429,925
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611,806	571,232	533,648	498,434	465,168	433,533
614,62	573,579	535,607	500,059	466,498	434,598
617,324	575,832	537,487	501,617	467,774	435,619
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624,992	582,208	542,801	506,02	471,376	438,501
627,449	584,246	544,498	507,424	472,524	439,419
629,874	586,255	546,169	508,807	473,654	440,323
632,272	588,242	547,819	510,172	474,769	441,215
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189,732
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0,6	204,654	183,884	163,76	144,213	125,195	106,7
0,7	206,461	185,465	165,13	145,382	126,175	107,5
0,8	208,13	186,924	166,39	146,461	127,079	108,2
0,9	209,697	188,294	167,58	147,475	127,928	108,9
1	211,186	189,596	168,7	148,437	128,735	109,5
1,1	212,615	190,844	169,79	149,36	129,509	110,2
1,2	213,995	192,051	170,83	150,252	130,256	110,8
1,3	215,337	193,224	171,84	151,119	130,983	111,4
1,4	216,647	194,369	172,84	151,965	131,692	112
1,5	217,933	195,493	173,81	152,795	132,387	112,5
1,6	219,198	196,598	174,77	153,612	133,072	113,1
1,7	220,447	197,69	175,71	154,418	133,747	113,6
1,8	221,683	198,77	176,64	155,215	134,415	114,2
1,9	222,909	199,84	177,57	156,005	135,077	114,7
2	224,126	200,904	178,49	156,79	135,734	115,3
2,1	225,337	201,961	179,4	157,57	136,387	115,8
2,2	226,542	203,013	180,31	158,346	137,037	116,3
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2,5	230,136	206,15	183,02	160,658	138,974	117,9
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2,7	232,521	208,23	184,82	162,191	140,257	118,9
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2,9	234,903	210,307	186,61	163,72	141,537	120
3	236,093	211,344	187,51	164,484	142,176	120,5
3,1	237,282	212,381	188,41	165,247	142,815	121
3,2	238,472	213,418	189,3	166,01	143,453	121,6
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3,5	242,042	216,528	191,98	168,296	145,367	123,1
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3,7	244,425	218,602	193,77	169,82	146,642	124,2
3,8	245,617	219,64	194,67	170,582	147,279	124,7
3,9	246,81	220,678	195,56	171,344	147,916	125,2
4	248,003	221,716	196,46	172,107	148,554	125,7
4,1	249,197	222,755	197,35	172,869	149,191	126,2
4,2	250,392	223,794	198,25	173,631	149,828	126,8
4,3	251,588	224,834	199,15	174,393	150,466	127,3
4,4	252,784	225,874	200,04	175,156	151,103	127,8
4,5	253,981	226,914	200,94	175,918	151,74	128,3
4,6	255,18	227,955	201,83	176,681	152,378	128,8
4,7	256,378	228,997	202,73	177,444	153,015	129,3
4,8	257,578	230,039	203,63	178,207	153,653	129,9
4,9	258,779	231,082	204,53	178,97	154,291	130,4
5	259,981	232,125	205,42	179,733	154,928	130,9
5,1	261,183	233,168	206,32	180,497	155,566	131,4
5,2	262,386	234,213	207,22	181,26	156,204	131,9
5,3	263,591	235,257	208,12	182,024	156,842	132,5
5,4	264,796	236,303	209,02	182,788	157,48	133
5,5	266,002	237,349	209,92	183,552	158,118	133,5
5,6	267,21	238,395	210,81	184,316	158,756	134
5,7	268,418	239,441	211,71	185,08	159,394	134,5
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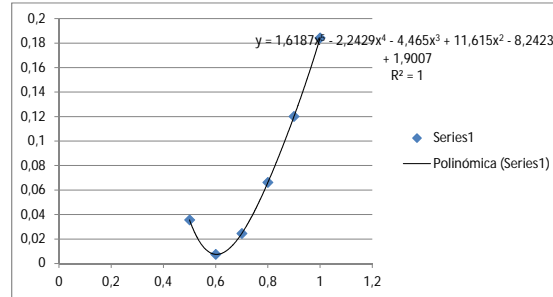
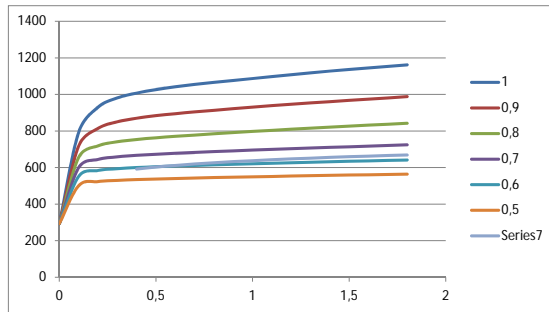
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1,4	489,647	467,369	445,836	424,965	404,692	384,961
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4,7	529,378	501,997	475,73	450,444	426,015	402,347
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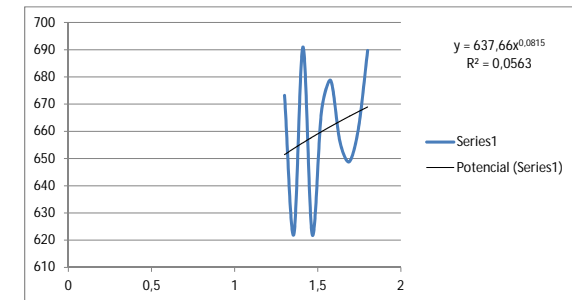
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1,4	854,858	687,465	548,146	437,163	358,503	284,061
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791,961	717,057	654,903	599,541	551,207	500,123
929,566	813,98	718,698	644,348	583,897	522,928
980,769	850,116	740,905	658,615	593,903	529,857
1007,314	869,691	753,499	666,763	599,784	534,067
1026,363	883,836	762,838	672,946	604,321	537,357
1042,191	894,699	770,7	678,222	608,203	540,183
1054,661	904,307	777,831	682,964	611,694	542,723
1065,814	913,309	784,656	687,352	614,919	545,068
1076,537	921,951	791,136	691,49	617,952	547,271
1087,011	930,361	797,392	695,443	620,841	549,366
1097,466	938,628	803,505	699,255	623,62	551,376
1107,768	946,488	809,52	702,961	626,312	553,321
1117,974	953,605	815,421	706,59	628,935	555,212
1127,858	960,465	821,146	710,163	631,503	557,061
1136,756	967,298	826,595	713,692	634,029	558,876
1145,132	974,177	831,783	717,192	636,522	560,664
1153,514	981,098	836,935	720,666	638,99	562,431
1162,093	988,086	842,102	724,121	641,439	564,181

0,85555556	349	622			
0,911111111	386,1	659,1			
0,966666667	390,6	663,6			
1,022222222	389,2	662,2			
1,077777778	392,8	665,8			
1,133333333	413,9	686,9			
1,188888889	410,4	683,4			
1,244444444	415,1	688,1			
1,3	431	704	1,3	400,2	673,2
1,355555556	437,1	710,1	1,355555556	349	622
1,411111111	432,6	705,6	1,411111111	418	691
1,466666667	433,5	706,5	1,466666667	349	622
1,522222222	433,5	706,5	1,522222222	394,2	667,2
1,577777778	408	681	1,577777778	405,7	678,7
1,633333333	372,7	645,7	1,633333333	383,2	656,2
1,688888889	420	693	1,688888889	375,8	648,8
1,744444444	353,7	626,7	1,744444444	388	661
1,8	439,1	712,1	1,8	416,7	689,7



625,096	0,373878	0,15311	0,04219493	0,00444325	0,00163963	0,02120619	591,775613	0,49306954	0,22055203	0,07468468	0,01605692	0,00018314	0,00950971
634,894	0,380183	0,15374	0,0406106	0,00359218	0,00231882	0,02360122	602,63622	0,49438054	0,21773061	0,07066823	0,01361197	7,8158E-06	0,01173382
643,013	0,385383	0,15321	0,0394322	0,00299819	0,00293074	0,02557424	611,657777	0,49544601	0,2141324	0,06760952	0,01184308	3,1902E-05	0,0136549
649,959	0,387702	0,15314	0,03870582	0,00257857	0,00346608	0,02722147	619,390678	0,49384286	0,21159496	0,06543379	0,01053466	0,00015441	0,01532129
656,037	0,390157	0,15379	0,03843749	0,00227852	0,00392829	0,02861183	626,168201	0,49297238	0,21028476	0,06406335	0,00954753	0,00032275	0,01677497
661,445	0,393824	0,15511	0,03844452	0,00206331	0,0043236	0,02979512	632,20793	0,49395749	0,21004204	0,0631948	0,00879279	0,00050848	0,01804984
666,32	0,398622	0,15703	0,03869494	0,00191032	0,00465861	0,03080807	637,66	0,4965844	0,21070268	0,06274881	0,00821149	0,0006957	0,01917273
670,761	0,404687	0,15948	0,03916452	0,00180454	0,0049393	0,03167853	642,63249	0,50093289	0,21215091	0,06266692	0,00776342	0,00087529	0,02016518
674,841	0,411552	0,16203	0,03982841	0,00173625	0,0051714	0,03242616	647,205868	0,50639751	0,21383396	0,06289669	0,00742138	0,0010422	0,02104293
678,617	0,419166	0,1642	0,04063952	0,00169914	0,00535979	0,03306859	651,441704	0,51287592	0,21514552	0,06336171	0,0071666	0,00119364	0,02182063
682,131	0,426974	0,16649	0,04153226	0,00168874	0,00550872	0,03361804	655,388188	0,51969784	0,21668117	0,06396624	0,00698497	0,00132819	0,02250868
685,419	0,433599	0,16913	0,04242348	0,00170144	0,00562149	0,03408524	659,083763	0,52526538	0,2186876	0,06459615	0,00686491	0,0014451	0,02311647
688,51	0,43984	0,17215	0,0433023	0,00173544	0,00570138	0,03447876	662,559604	0,53048737	0,22120426	0,06523353	0,00679909	0,00154437	0,02365163
691,425	0,446643	0,17552	0,04428889	0,00178851	0,00575114	0,03480562	665,841335	0,53643274	0,2241749	0,06602771	0,0067797	0,00162626	0,02412051
694,185	0,454328	0,17925	0,04540298	0,00185965	0,0057734	0,03507228	668,950348	0,54344721	0,22759509	0,06699857	0,00680187	0,00169136	0,02452905
0,165281	0,10387	0,05220059	0,01227066	0,01726813	0,04502105			0,18421957	0,12008354	0,06613625	0,02451126	0,00749833	0,03560102



t [s]	1	0,9	0,8	0,7	0,6	0,5
1E-06	20	20	20	20	20	20
0,1	284,307	253,903	224,62	196,347	168,976	142,4
0,2	318,718	281,872	247,23	214,461	183,277	153,5
0,3	329,272	290,357	254,09	219,994	187,701	156,9
0,4	335,437	295,413	258,25	223,414	190,478	159,2
0,5	340,182	299,336	261,51	226,101	192,669	160,9
0,6	344,24	302,699	264,3	228,411	194,555	162,4
0,7	347,889	305,721	266,81	230,488	196,251	163,8
0,8	351,262	308,512	269,13	232,405	197,816	165
0,9	354,433	311,136	271,31	234,206	199,287	166,2
1	357,454	313,633	273,38	235,917	200,684	167,3
1,1	360,359	316,031	275,37	237,56	202,024	168,4
1,2	363,174	318,351	277,3	239,147	203,319	169,4
1,3	365,917	320,61	279,17	240,691	204,577	170,4
1,4	368,604	322,82	281	242,199	205,807	171,4
1,5	371,247	324,992	282,79	243,679	207,013	172,3
1,6	373,857	327,133	284,56	245,136	208,201	173,3
1,7	376,441	329,25	286,31	246,574	209,373	174,2
1,8	379,006	331,349	288,04	247,999	210,532	175,2
1,9	381,557	333,434	289,76	249,411	211,682	176,1
2	384,099	335,508	291,47	250,814	212,824	177
2,1	386,635	337,573	293,17	252,21	213,959	177,9
2,2	389,168	339,634	294,86	253,6	215,09	178,8
2,3	391,701	341,69	296,55	254,986	216,216	179,7
2,4	394,236	343,746	298,24	256,368	217,339	180,6
2,5	396,773	345,801	299,92	257,748	218,46	181,5
2,6	399,316	347,856	301,61	259,126	219,579	182,4
2,7	401,863	349,913	303,29	260,503	220,696	183,2
2,8	404,417	351,972	304,97	261,879	221,813	184,1
2,9	406,978	354,033	306,65	263,254	222,929	185
3	409,547	356,096	308,34	264,63	224,044	185,9
3,1	412,125	358,164	310,02	266,006	225,159	186,8
3,2	414,713	360,236	311,71	267,382	226,272	187,7
3,3	417,312	362,312	313,4	268,759	227,386	188,6
3,4	419,922	364,393	315,09	270,136	228,501	189,5
3,5	422,544	366,478	316,78	271,514	229,616	190,3
3,6	425,177	368,57	318,47	272,893	230,73	191,2
3,7	427,825	370,666	320,17	274,273	231,846	192,1
3,8	430,487	372,768	321,87	275,655	232,962	193
3,9	433,163	374,875	323,57	277,037	234,078	193,9
4	435,853	376,988	325,27	278,42	235,195	194,8
4,1	438,559	379,107	326,98	279,805	236,312	195,6
4,2	441,28	381,231	328,69	281,191	237,43	196,5
4,3	444,014	383,363	330,4	282,579	238,548	197,4
4,4	446,762	385,501	332,11	283,968	239,667	198,3
4,5	449,526	387,646	333,83	285,358	240,787	199,2
4,6	452,303	389,797	335,55	286,75	241,907	200,1
4,7	455,098	391,956	337,28	288,143	243,028	201
4,8	457,909	394,122	339,01	289,538	244,15	201,9
4,9	460,738	396,295	340,74	290,934	245,272	202,7
5	463,586	398,476	342,47	292,332	246,395	203,6
5,1	466,45	400,665	344,21	293,731	247,519	204,5
5,2	469,33	402,861	345,95	295,132	248,643	205,4
5,3	472,227	405,065	347,7	296,534	249,768	206,3
5,4	475,144	407,276	349,44	297,938	250,894	207,2
5,5	478,087	409,496	351,2	299,344	252,02	208,1
5,6	481,063	411,724	352,95	300,752	253,148	209
5,7	484,073	413,959	354,71	302,161	254,276	209,9
5,8	487,108	416,202	356,47	303,572	255,404	210,7
5,9	490,161	418,454	358,24	304,984	256,534	211,6

t [s]	1	0,9	0,8	0,7	0,6	0,5
0,000001	293	293	293	293	293	293
0,1	557,307	526,903	497,618	469,347	441,976	415,441
0,2	591,718	554,872	520,229	487,461	456,277	426,475
0,3	602,272	563,357	527,086	492,994	460,701	429,943
0,4	608,437	568,413	531,251	496,414	463,478	432,15
0,5	613,182	572,336	534,506	499,101	465,669	433,898
0,6	617,24	575,699	537,3	501,411	467,555	435,403
0,7	620,889	578,721	539,812	503,488	469,251	436,758
0,8	624,262	581,512	542,132	505,405	470,816	438,008
0,9	627,433	584,136	544,311	507,206	472,287	439,182
1	630,454	586,633	546,383	508,917	473,684	440,298
1,1	633,359	589,031	548,373	510,56	475,024	441,368
1,2	636,174	591,351	550,296	512,147	476,319	442,401
1,3	638,917	593,61	552,167	513,691	477,577	443,406
1,4	641,604	595,82	553,997	515,199	478,807	444,387
1,5	644,247	597,992	555,793	516,679	480,013	445,349
1,6	646,857	600,133	557,562	518,136	481,201	446,296
1,7	649,441	602,25	559,31	519,574	482,373	447,231
1,8	652,006	604,349	561,041	520,999	483,532	448,155
1,9	654,557	606,434	562,76	522,411	484,682	449,071
2	657,099	608,508	564,468	523,814	485,824	449,981
2,1	659,635	610,573	566,168	525,21	486,959	450,886
2,2	662,168	612,634	567,863	526,6	488,09	451,786
2,3	664,701	614,69	569,553	527,986	489,216	452,683
2,4	667,236	616,746	571,239	529,368	490,339	453,577
2,5	669,773	618,801	572,924	530,748	491,46	454,469
2,6	672,316	620,856	574,607	532,126	492,579	455,359
2,7	674,863	622,913	576,29	533,503	493,696	456,248
2,8	677,417	624,972	577,972	534,879	494,813	457,136
2,9	679,978	627,033	579,654	536,254	495,929	458,023
3	682,547	629,096	581,337	537,63	497,044	458,909
3,1	685,125	631,164	583,021	539,006	498,159	459,795
3,2	687,713	633,236	584,707	540,382	499,272	460,681
3,3	690,312	635,312	586,395	541,759	500,386	461,566
3,4	692,922	637,393	588,085	543,136	501,501	462,451
3,5	695,544	639,478	589,777	544,514	502,616	463,336
3,6	698,177	641,57	591,471	545,893	503,73	464,222
3,7	700,825	643,666	593,167	547,273	504,846	465,107
3,8	703,487	645,768	594,865	548,655	505,962	465,992
3,9	706,163	647,875	596,566	550,037	507,078	466,878
4	708,853	649,988	598,27	551,42	508,195	467,764
4,1	711,559	652,107	599,977	552,805	509,312	468,649
4,2	714,28	654,231	601,686	554,191	510,43	469,536
4,3	717,014	656,363	603,399	555,579	511,548	470,422
4,4	719,762	658,501	605,114	556,968	512,667	471,308
4,5	722,526	660,646	606,833	558,358	513,787	472,195
4,6	725,303	662,797	608,554	559,75	514,907	473,082
4,7	728,098	664,956	610,279	561,143	516,028	473,969
4,8	730,909	667,122	612,006	562,538	517,15	474,857
4,9	733,738	669,295	613,737	563,934	518,272	475,745
5	736,586	671,476	615,471	565,332	519,395	476,633
5,1	739,45	673,665	617,208	566,731	520,519	477,521
5,2	742,33	675,861	618,95	568,132	521,643	478,41
5,3	745,227	678,065	620,695	569,534	522,768	479,299
5,4	748,144	680,276	622,444	570,938	523,894	480,188
5,5	751,087	682,496	624,196	572,344	525,02	481,078
5,6	754,063	684,724	625,951	573,752	526,148	481,968
5,7	757,073	686,959	627,711	575,161	527,276	482,858
5,8	760,108	689,202	629,474	576,572	528,404	483,748
5,9	763,161	691,454	631,24	577,984	529,534	484,639

631,615916	0,00415226	0,00029021	0,00814666	0,02481144	0,04845673	0,07787287
632,718464	0,00443672	0,00024017	0,00795381	0,02458882	0,04827796	0,07778987
633,821012	0,00473107	0,00019492	0,00776422	0,02436847	0,04810015	0,07770808
634,92356	0,00503538	0,00015444	0,00757756	0,02415035	0,04792396	0,07762749
636,026108	0,00534991	0,00011872	0,00739353	0,02393349	0,0477494	0,0775481
637,128656	0,00567495	8,7643E-05	0,00721212	0,02371834	0,04757575	0,07746902
638,231204	0,00601084	6,1256E-05	0,00703306	0,02350491	0,04740439	0,07739026
639,333752	0,00635791	3,9571E-05	0,00685634	0,02329269	0,04723325	0,07731267
640,4363	0,0067163	2,2581E-05	0,00668195	0,02308216	0,04706232	0,07723