SEPAR Rekursion full dark sector und zentraler Rekursion in H[k]
delta=1 kappa7 aus HDach7 berechnet
lange Intervalle bis Oktober
mit Impfung, Veranschlagung der Mutante durch erhöhtes gamma
übernommen vom 04.05.2021;
20.06.2021

```
In[ ]:= Char1[x_, axx_ , bxx_] := 2^-1 (Sign[x - axx] - Sign[x - bxx]);
                                      Vorzeichen      Vorzeichen

suppMult[x_, Axx_, Bxx_, cxx_] =
  (Char1[x, -10^6, Axx] + ((1 + cxx) / 2 + ((1 - cxx) / 2) Cos[((x - Axx) Pi) / (Bxx - Axx)])
                                                  Kosinus      Kreiszahl π

    Char1[x, Axx, Bxx] + cxx Char1[x, Bxx, 10^6]);
(*multiplikative Absenkung bzw Anhebung von 1 auf cxx von
  A nach B f mit cosinus-Glättung*)
LinsuppMult[x_, Axx_, Bxx_, cxx_] = Char1[x, -10^6, Axx] +
   (1 + (cxx - 1) / (Bxx - Axx) (x - Axx)) Char1[x, Axx, Bxx] + cxx Char1[x, Bxx, 10^6];
 (*multiplikative Absenkung bzw Anhebung von 1 auf cxx von A nach B linear*)
Char[x_, AAA_, BBB_] = Piecewise[{{1, AAA <= x <= BBB}}, 0];
                               stückweise
(*charakteristische Funktion des Intervalls [a,b])*)
hilf1ModMult[x_] = Piecewise[{{0, x ≤ 0}, {Exp[-x^-1], 0 ≤ x}}];
                               stückweise      Exponentialfunktion

hilf2ModMult[x_] = hilf1ModMult[x] / (hilf1ModMult[x] + hilf1ModMult[1 - x]);

ModMult[x_, AAA_, BBB_, ccc_] = 1 + (ccc - 1) hilf2ModMult[(x - AAA) / (BBB - AAA)]
 (*glatte Anhebung um Faktor ccc im Intervall [AAA,BBB]*) ;
```

(i) Eingabe von

e, p_c, p_d, q, N0, α, δ, ζ (Faktor Infektivität Mutante)
parT, Impf-Funktion V(k)
Conf0 = AtotJHU0
a0, eta7 für k=1 bis t1/.parT -- wichtig: Auswertung mit dark Faktor δ wie oben
aa[j] Modellwerte für η[j]
AneuJHU für k 1 bis 1 +p+q

```
In[ ]:= Print["e= ", e, "  pc= ", pc, "  pd= ", pd, "  q= ",
          q, "  α= ", α, "  δ= ", δ, "  ξ= ", ξ, "  ",  N = ", N0];
        (*Beginn des ersten Hauptintervalls *)
        (*end of data*)
        teod = Length[QJHU]; datet1 = DatePlus[datet0, t1JHU - 1];
        Print["t0 in JHU-Zählung = ", t0JHU,
          " in Landeszählung  = 1,", " i.e. ", datet0, ";
         t1 in Landeszählung  = ", t1JHU, " i.e. ", datet1];
```

e= 2 pc= 7 pd= 10 q= 15 $\alpha = \frac{1}{2}$ δ= 1 ξ= ξ, N = 84 000 000

t0 in JHU-Zählung = 35 in Landeszählung = 1, i.e. {2020, 2, 25};
t1 in Landeszählung = 29 i.e. {2020, 3, 24}

Aktuelle Daten (lange Intervalle)

```
In[ ]:= (*lange Intervalle im Sommer 2020*)
        parT = {t0 → 1, t1 → t1JHU, t2 → 62, Δ2 → 2, t3 → 132, Δ3 → 4, t4 → 216 + 2,
            Δ4 → 9, t5 → tOct1 + 30(*tOct1+17*), Δ5 → 11 , t6 → tNov1 + 27 - 2,
            Δ6 → 8 , (*t10→tNov1+27-2,Δ10→8 ,*)t7 → tDec1 + 13 + 2, Δ7 → 6 ,
            t8 → tMar12021(*+7-1*), Δ8 → 7 , t9 → tApr12021 + 9(*+7-1*), Δ9 → 7 };
        datet1 = DatePlus[datet0, -1 + t1 /. parT];
        datet2 = DatePlus[datet0, -1 + t2 /. parT];
        datet3 = DatePlus[datet0, -1 + t3 /. parT];
        datet4 = DatePlus[datet0, -1 + t4 /. parT];
        datet5 = DatePlus[datet0, -1 + t5 /. parT];
        datet6 = DatePlus[datet0, -1 + t6 /. parT];
        datet7 = DatePlus[datet0, -1 + t7 /. parT];
        datet8 = DatePlus[datet0, -1 + t8 /. parT];
        datet9 = DatePlus[datet0, -1 + t9 /. parT];
```

```
(*datet10=DatePlus[datet0, -1+t10/.parT];
datet11=DatePlus[datet0, -1+t11/.parT];
datet12=DatePlus[datet0, -1+t12/.parT];
datet13=DatePlus[datet0, -1+t13/.parT];*)
eod = DatePlus[datet0, Length[QJHU] - 1];
Print["t0=", t0 /. parT, ",  t0JHU=", t0JHU, ",  i.e. ", datet0];
Print["t1=", t1 /. parT, ",  t1JHU=", t0JHU + t1 /. parT, ",  i.e. ", datet1];
Print["t2=", t2 /. parT, ",  t2JHU=", t0JHU + t2 /. parT, ",  i.e. ", datet2];
Print["t3=", t3 /. parT, ",  t3JHU=", t0JHU + t3 /. parT, ",  i.e. ", datet3];
Print["t4=", t4 /. parT, ",  t4JHU=", t0JHU + t4 /. parT, ",  i.e. ", datet4];
Print["t5=", t5 /. parT, ",  t5JHU=", t0JHU + t5 /. parT, ",  i.e. ", datet5];
Print["t6=", t6 /. parT, ",  t6JHU=", t0JHU + t6 /. parT, ",  i.e. ", datet6];
Print["t7=", t7 /. parT, ",  t7JHU=", t0JHU + t7 /. parT, ",  i.e. ", datet7];
Print["t8=", t8 /. parT, ",  t8JHU=", t0JHU + t8 /. parT, ",  i.e. ", datet8];
Print["t9=", t9 /. parT, ",  t9JHU=", t0JHU + t9 /. parT, ",  i.e. ", datet9];
(*Print["t10=",t10/.parT, ",  t10JHU=",  t0JHU+t10/.parT,",  i.e. ", datet10];
Print["t11=",t11/.parT, ",  t10JHU=",  t0JHU+t11/.parT,",  i.e. ", datet11];
Print["t12=",t12/.parT, ",  t10JHU=",  t0JHU+t12/.parT,",  i.e. ", datet12];
Print["t13=",t13/.parT, ",  t10JHU=",  t0JHU+t13/.parT,",  i.e. ", datet13];*)
Print["eod=", Length[QJHU], " i.e. ", eod];(*Intervall-Mittelwerte  der a-quer(k) *)
κ = N[{Mean[Take[kappa7, {t0, t1} /. parT]],
   Mean[Take[kappa7, {t1, t2 - Δ2} /. parT]],
   Mean[Take[kappa7, {t2, t3 - Δ3} /. parT]],
```

```
    Mean[Take[kappa7 , {t3 , t4 - Δ4} /. parT]],
    Mean[Take[kappa7 , {t4 , t5 - Δ5} /. parT]],
    Mean[Take[kappa7 , {t5 , t6 - Δ6} /. parT]],
    Mean[Take[kappa7 , {t6 , t7 - Δ7} /. parT]],
    Mean[Take[kappa7 , {t7 , t8 - Δ8} /. parT]],
     Mean[Take[kappa7 , {t8 , t9 - Δ9} /. parT]],
    Mean[Take[kappa7 , {t9 , Length[kappa7]} /. parT]](*,
    Mean[Take[kappa7 ,{t10 ,Length[kappa7]}/.parT]] (
        Mean[Take[kappa7 ,{t11 ,t12}/.parT]]
           Mean[Take[kappa7 ,{t12 ,t13-Δ13}/.parT]],
       Mean[Take[kappa7 ,{t13 ,Length[kappa7]}/.parT]]*)
  }] ;

sigmaκ = {StandardDeviation [Take[kappa7 , {t0 , t1 - 1} /. parT]],
    StandardDeviation [Take[kappa7 , {t1 , t2 - Δ2} /. parT]],
    StandardDeviation [Take[kappa7 , {t2 , t3 - Δ3} /. parT]],
    StandardDeviation [Take[kappa7 , {t3 , t4 - Δ4} /. parT]],
    StandardDeviation [Take[kappa7 , {t4 , t5 - Δ5} /. parT]],
    StandardDeviation [Take[kappa7 , {t5 , t6 - Δ6} /. parT]],
    StandardDeviation [Take[kappa7 , {t6 , t7 - Δ7} /. parT]],
    StandardDeviation [Take[kappa7 , {t7 , t8 - Δ8} /. parT]],
    StandardDeviation [Take[kappa7 , {t8 , t9 - Δ9} /. parT]] ,
    StandardDeviation [Take[kappa7 , {t9 , Length[kappa7]} /. parT]](*,
    StandardDeviation [Take[kappa7 ,{t10 ,Length[kappa7]}/.parT]],
```

```
    StandardDeviation [Take[kappa7 ,{t11 ,t12}/.parT]],
    StandardDeviation [Take[kappa7 ,{t12 ,t13-Δ13}/.parT]],
    StandardDeviation [Take[kappa7 ,{t13 ,Length[kappa7]}/.parT]]*)
  };
t0=1,  t0JHU=35,  i.e. {2020, 2, 25}
t1=29,  t1JHU=64,  i.e. {2020, 3, 24}
t2=62,  t2JHU=97,  i.e. {2020, 4, 26}
t3=132,  t3JHU=167,  i.e. {2020, 7, 5}
t4=218,  t4JHU=253,  i.e. {2020, 9, 29}
t5=250,  t5JHU=285,  i.e. {2020, 10, 31}
t6=276,  t6JHU=311,  i.e. {2020, 11, 26}
t7=296,  t7JHU=331,  i.e. {2020, 12, 16}
t8=371,  t8JHU=406,  i.e. {2021, 3, 1}
t9=411,  t9JHU=446,  i.e. {2021, 4, 10}
eod=481 i.e. {2021, 6, 19}
```

In[ ]:= **datendkappa**

Out[ ]= {2021, 4, 20}

In[ ]:=

In[ ]:= **κ**

Out[ ]= {0.496097, 0.130688, 0.167522, 0.208276,
0.279392, 0.180225, 0.208846, 0.165039, 0.167418, 0.135048}

In[ ]:= **sigmaκ**

Out[ ]= {0.229569, 0.0149033, 0.0524143, 0.0213191, 0.0146389,
0.00541032, 0.00849333, 0.0212111, 0.0256985, 0.0134803}

In[ ]:=

In[ ]:= **Length[κ]**

Länge

Out[ ]= 10

In[ ]:=

In[ ]:=

```
faktor1 = 1; faktor2 = 1;
a1 = κ[[2]](*-0.3sigmaκ[[2]]*); a2 = κ[[3]] - 0.1 sigmaκ[[3]] ; a3 = κ[[4]](*-0.6sigmaκ[[4]]*);
a4 = κ[[5]] - 0.6 sigmaκ[[5]]; a5 = κ[[6]] - 0.2 sigmaκ[[6]]; a6 = κ[[7]] (*-0.1sigmaκ[[7]]*);
```

```
a7 = κ[[8]] - 0.15 sigmaκ[[8]];
a8 = κ[[9]] + 0.15 sigmaκ[[9]];
a9 = κ[[10]] + 0 sigmaκ[[10]];
aa[x_] = a1 suppMult[x, t2 - Δ2, t2, a2/a1] × suppMult[x, t3 - Δ3, t3, a3/a2] ×
    suppMult[x, t4 - Δ4, t4, a4/a3] * suppMult[x, t5 - Δ5, t5, a5/a4] ×
    suppMult[x, t6 - Δ6, t6, a6/a5] × suppMult[x, t7 - Δ7, t7, a7/a6] ×
    suppMult[x, t8 - Δ8, t8, a8/a7] × suppMult[x, t9 - Δ9, t9, a9/a8]
    (*suppMult[x,t11-Δ11,t11,a11/a10]suppMult[x,t12-Δ12,t12,a12/a11]*) /. parT;
aModel = Table[aa[k], {k, t1 /. parT, kend}];
          Tabelle
GraphaModelX = DateListPlot[Take[aModel, Length[kappa7] + 15], datet1,
                graphische Darst···  entferne  Länge
  PlotStyle → {Black, Dashed}, Sequence[PlotTheme → "Detailed", ImageSize → Medium],
  Darstellungsstil  schwarz  gestrichelt  Sequenz  Thema der graphischen Darstellung  Bildgröße  mittelgroß
  (*GridLines→{{{"{2020,03,24}" ,Thick},{"{2020,04,26}",Thick},
    Gitternetzlinien  dick  dick
     {"{2020,07,05}",Thick},{"{2020,09,27}",Thick},{"{2020,10,31}",Thick},
                      dick  dick  dick
     {"{2020,12,6}",Thick},{"{2021,03,02}",Thick}},{0.1,0.2,0.3,0.4}},*)
                      dick  dick
  GridLines → {{"{2020,03,24}" , "{2020,04,26}", "{2020,07,05}", "{2020,09,29}",
    Gitternetzlinien
     "{2020,10,31}", "{2020,11,26}", "{2020,12,16}", "{2021,03,07}"}, Automatic},
                                                                  automatisch
  GridLinesStyle → {Directive[Gray], Directive[Dotted]}, PlotRange → {0, 0.4}];
  Stil der Gitternetzlinien  Anweisung  grau  Anweisung  punktiert  Koordinatenbereich der Graphik
GraphaModel = DateListPlot[Take[aModel, Length[kappa7] + 15], datet1,
               graphische Darst···  entferne  Länge
  PlotStyle → {Black, Dashed}, Sequence[PlotTheme → "Detailed", ImageSize → Medium],
  Darstellungsstil  schwarz  gestrichelt  Sequenz  Thema der graphischen Darstellung  Bildgröße  mittelgroß
  Epilog → {Text[Subscript["J", 1], {{2020, 04, 6}, 0.02}], Text[Subscript["J", 2],
  Epilog  Text  Tiefstellung  Text  Tiefstellung
     {{2020, 06, 1}, 0.02}], Text[Subscript["J", 3], {{2020, 08, 12}, 0.02}], Text[
       Text  Tiefstellung  Text
     Subscript["J", 4], {{2020, 10, 14}, 0.02}], Text[Subscript["J", 5], {{2020, 11, 14},
     Tiefstellung  Text  Tiefstellung
      0.02}], Text[Subscript["J", 6], {{2020, 12, 7}, 0.02}], Text[Subscript["J", 7],
            Text  Tiefstellung  Text  Tiefstellung
     {{2021, 01, 26}, 0.02}], Text[Subscript["J", 8], {{2021, 04, 2}, 0.02}]},
                                  Text  Tiefstellung
```

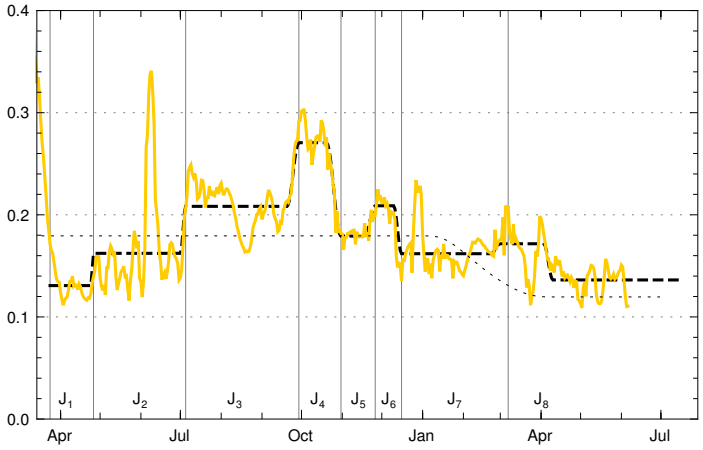
```
(*GridLines→{{{"{2020,03,24}" ,Thick},{"{2020,04,26}",Thick},
   {"{2020,07,05}",Thick},{"{2020,09,27}",Thick},{"{2020,10,31}",Thick},
   {"{2020,12,6}",Thick},{"{2021,03,02}",Thick}},{0.1,0.2,0.3,0.4}},*)
 GridLines → {{"{2020,03,24}" , "{2020,04,26}", "{2020,07,05}", "{2020,09,29}",
   "{2020,10,31}", "{2020,11,26}", "{2020,12,16}", "{2021,03,07}"}, Automatic},
 GridLinesStyle → {Directive[Gray], Directive[Dotted]}, PlotRange → {0, 0.4}];

Graphkappa7A = DateListPlot[Take[kappa7 , Length[kappa7]], datet0 , (*Joined→False ,*)
 PlotStyle → {Colorkappa }, Sequence[PlotTheme → "Detailed", ImageSize → Medium] ,
 (*GridLines→{{{"{2020,03,24}",Thick},{"{2020,04,26}",Thick},{"{2020,07,05}",Thick},
   {"{2020,09,27}",Thick},{"{2020,10,31}",Thick},{"{2020,12,6}",Thick},
   {"{2021,03,02}",Thick}},{0.1,0.2,0.3,0.4,0.5,0.6,0.7}},*)
 PlotRange → {0, 0.8}, FrameLabel → {None , "kappa"}];

Graphcrit = DateListPlot[Table[1 / ptilde[k], {k, 1, tMay12021
+ 60}], datet0 , Sequence[PlotTheme → "Detailed", ImageSize → Medium],
 PlotStyle → {Black , Thin , Dotted}];

Print["a1=", a1, " a2=", a2, "  a3 =" , a3, " a4 =" , a4, " a5 =" , a5,
 " a6 =" , a6, " a7 =" , a7 (*,  " a8 =" , a8  ,  " a9 =" , a9   ,
 " a10 =" , a10 ,   " a11 =" , a11 ,   " a12 =" , a12,   " a13 =" , a13*)];
Print[Show[GraphaModel , Graphkappa7A , Graphcrit]]
Print["Kontaktraten  D mit  Modellwerten "]
```

```
a1=0.130688  a2=0.16228   a3 =0.208276
  a4 =0.270609  a5 =0.179143  a6 =0.208846  a7 =0.161909
```



Kontaktraten D mit Modellwerten

In[ ]:=

```
Export["/file-path/graph-D-kappa.pdf", %]
```

exportiere leite ab

In[ ]:=

```
"//home/erhard/Dropbox/Mathematica_notebooks /Corona/Deutschland-2021-06ff/graph-D-kappa
   .pdf"
```

leite ab

In[ ]:=

```
a8 / a7
```

Out[ ]=

```
1.0009
```

für c=1.5 a8/a7= 1.15 (am 27.03.)

In[ ]:=

```
datendkappa
```

Out[ ]=

```
{2021, 4, 20}
```

In[ ]:=

```
datendRhokappa
```

Out[ ]=

```
{2021, 4, 12}
```

In[ ]:=

```
kappa7von0
```

Out[ ]=

```
1.04078
```

In[ ]:=

```
X0 = 1 - (e + pd); kend = 1000;
Do[qq[j] = q, {j, -100, kend}];
```

iteriere

In[ ]:=

```
gamma
```

Out[ ]=

```
{0.5, 0.9, 0.9, 0.85, 0.8, 0.7, 0.6, 0.45, 0.15, 0.05}
```

--- --- --- --- --- --

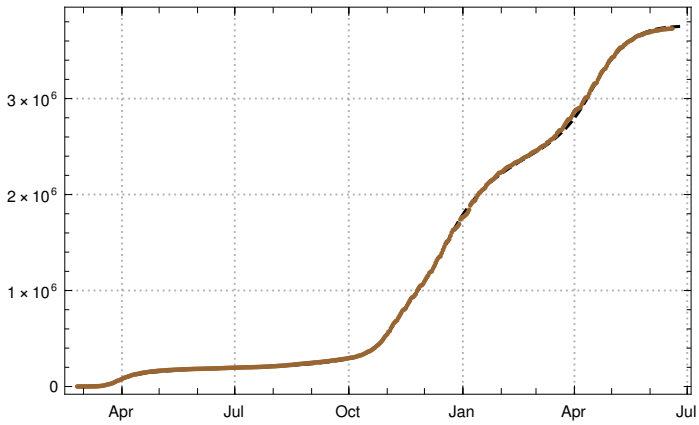
Run <SEPAR- recursion-2014-04-17.nb> version (iii)

```
NotebookEvaluate["/file-path/SEPAR-recursion-Version-iii-2021-06-20.nb"]
```

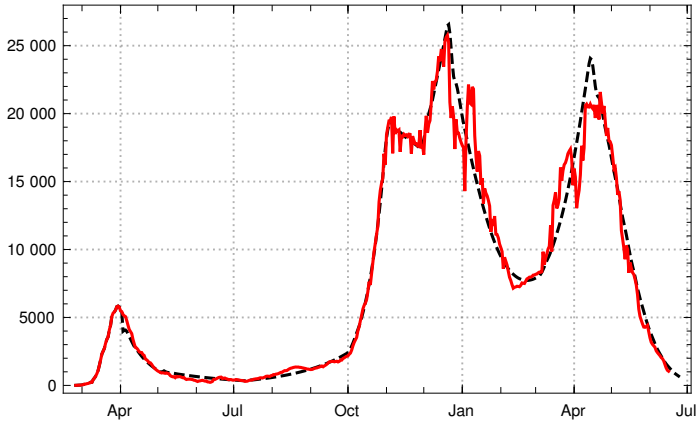
werte aus im Notebook

a0=1.04078 RMESEQtot = 13 907.8

 RMESE Anew = 1253.07



Graph Qtot SEPAR (black dashed), QtotJHU =Confirmed



Graph Anew SEPAR (black dotted),

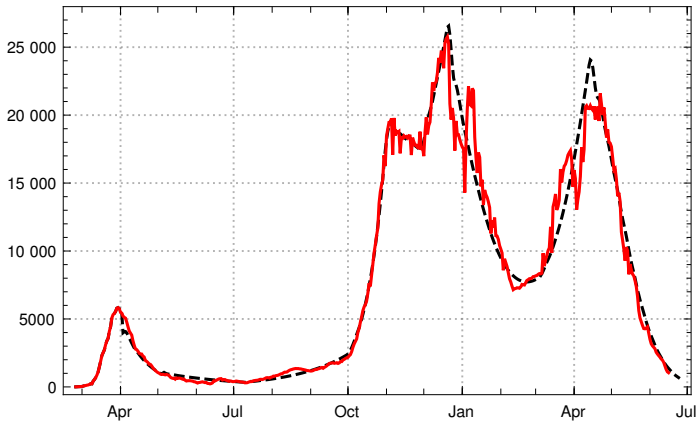
Out[ ]= ___22 __

In[ ]:= ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

In[ ]:= **Show[GraphQneurek , GraphQneu7JHU]**

zeige an

Out[ ]=



In[ ]:= **Length[kappa1] + e + pd**

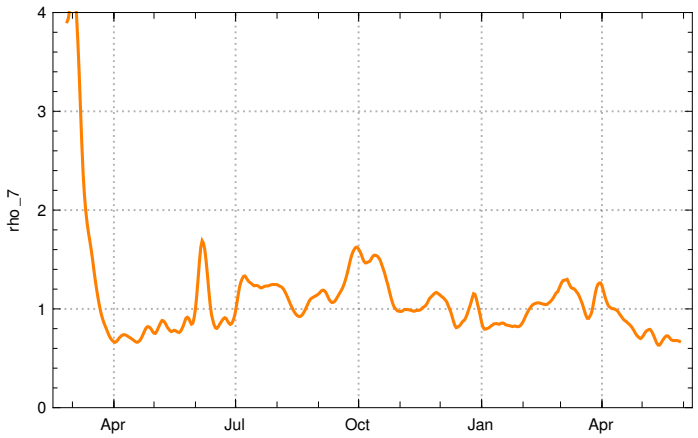
Länge

Out[ ]= 483

In[ ]:= **Show[GraphRhokappa7]**

zeige an

Out[ ]=



In[ ]:= **{Qneurek[[tApr12021]], Qneurek[[tApr12021 + 15 – 1]], Qneurek[[tMay12021]]}**

Out[ ]= {16 807.1 , 23 977.9 , 16 737.1}