

a) Einschaltvorgang der realen angepassten 380 kV 4-Bündel-Freileitung nach dem numerischen Koizumi-Verfahren
jeweils der Graph mit den Lösungspunkten und der Graph als kubischer Spline

```
In[ ]:= ta = UnixTime[];  
        [Unixzeit  
ClearAll[f0, U, P, Z0, Z1, l, x, Cs, Ls, Rs, Gs, ww, lap, M, Zeit, Liste, te];  
        [lösche alle
```

```

In[*]:= Koizumi[Fp_, t_, tende_] := Module[{coeff, arg, i, k, n, T, v1, v2, ck, ct, c1, c2},
    |Modul
    n = 8192;
    T = tende * 4;
    v1 = Pi / 2 / T;
    |Kreiszahl  $\pi$ 
    v2 = 2. / T;
    (*
    calculate coefficients*)
    coeff = Table[{Im[Fp[I * (1. - 2. * i) * v1]] * v2}, {i, 1, n}];
    |Tabelle |Imagi... |imaginäre Einheit I
    (*
    evaluate fourier series for each t*)
    arg = t * v1;
    ct = 2. * Cos[2. * arg];
    |Kosinus
    c2 = 0.;
    c1 = N[Indexd[coeff, {n, 1}]];
    |... |indiziert
    For[k = n - 1, k >= 1, k--,
    |For-Schleife
        ck = ct * c1 - c2 + N[Indexd[coeff, {k, 1}]];
        |... |indiziert
        c2 = c1;
        c1 = ck;];
    (c1 + c2) * Sin[arg]
    |Sinus

```

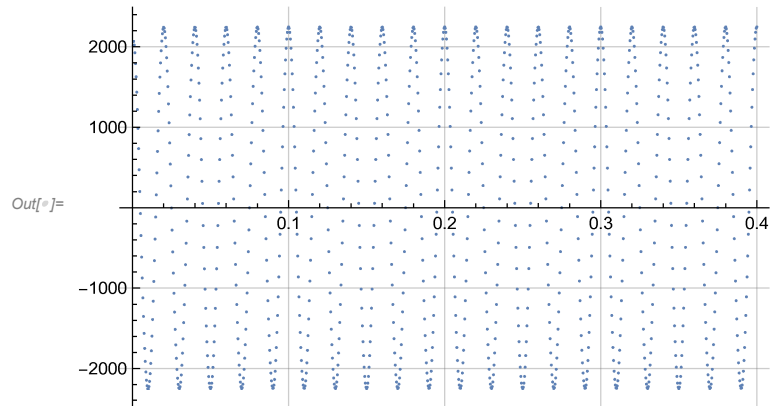
```

In[*]:= f0 = 50;
U = 380*^3;
P = 604*^6;
Z1 = 0.01;
Z0 = 239;
l = 100*^3;
x = 0;
Cs = 14.2*^-12;
Ls = 0.81*^-6;
Rs = 27.3*^-6;
Gs = 17*^-12;
ww = 2 * Pi * f0;
      |Kreiszahl r
Z2 = U^2 / P;

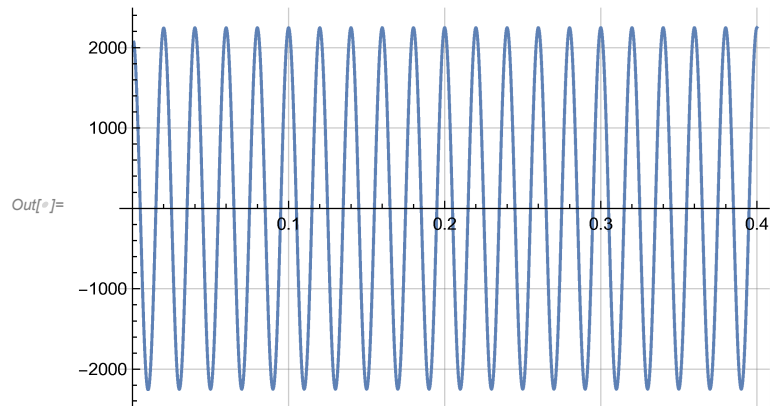
In[*]:= lap[p_] :=
  p / (ww^2 + p^2) * (Cosh[Sqrt[(Rs + p * Ls) * (Gs + p * Cs)] * (1 - x)] + Z2 / Z0 * Sinh[Sqrt[(Rs + p * Ls) * (Gs + p * Cs)] * (1 - x)]) /
      |Kos...|Quadratwurzel      |Sinu...|Quadratwurzel
  ((Z1 + Z2) * Cosh[Sqrt[(Rs + p * Ls) * (Gs + p * Cs)] * 1] + (Z0 + Z1 * Z2 / Z0) * Sinh[Sqrt[(Rs + p * Ls) * (Gs + p * Cs)] * 1]);
      |Kos...|Quadratwurzel      |Sinu...|Quadratwurzel

```

```
In[*]:= (*lap[p_]:=ww/(p^2+ww^2)*)  
M = 1024; Zeit = 20 / f0;  
Liste = Table[{Zeit / M * i, U * Sqrt[2] * Koizumi[lap, Zeit / M * i, Zeit]}, {i, 1, M}];  
ListPlot[Liste, PlotRange -> All, GridLines -> Automatic]
```



```
In[*]:= ListLinePlot[Liste, InterpolationOrder -> 3, PlotRange -> All, GridLines -> Automatic]
```



```
In[*]:= te = UnixTime[] - ta  
      |Unixzeit
```

```
      |N[te / 60]  
      |numerischer Wert
```

```
Out[*]= 256
```

```
Out[*]= 4.26667
```

```
In[*]:= Max[Liste]  
      |größtes Element
```

```
Out[*]= 2247.56
```