

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

```
In[25]:= ta = UnixTime[];  
          |Unixzeit  
ClearAll[f0, U, P, Z0, Z1, Z2, l, x, Cs, Ls, Rs, Gs, ww, lap, M, Zeit, Liste, te];  
          |lösche alle
```

```

In[27]:= 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[{Re[Fp[I * (1. - 2. * i) * v1]] * v2}, {i, 1, n}];
    |Tabelle |Realteil |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

```

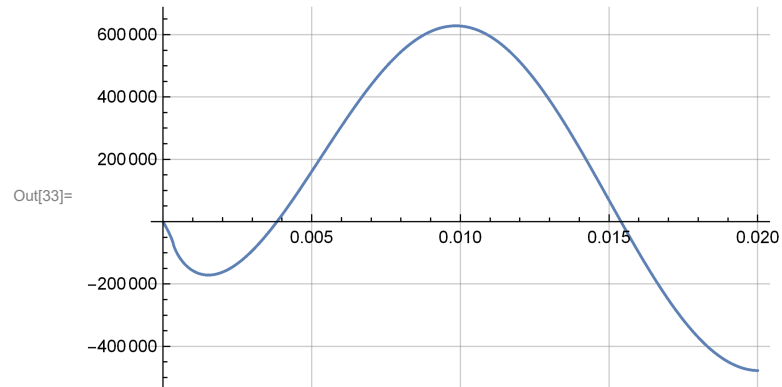
```

In[28]:= f0 = 50;
          U = 380*^3;
          P = 604*^6;
          Z1 = 0.01;
          Z0 = 239;
          l = 100*^3;
          x = 100*^3;
          Cs = 14.2*^-12;
          Ls = 0.81*^-6;
          Rs = 27.3*^-6;
          Gs = 17*^-12;
          ww = 2 * Pi * f0;
              |Kreiszahl π
          Z2 = U^2 / P;

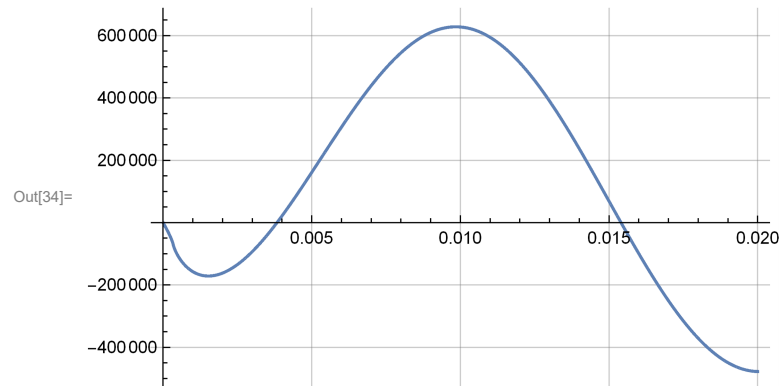
In[30]:= lap[p_] :=
          ww / (ww^2 + p^2) * (Z2 * Cosh[Sqrt[(Rs + p * Ls) * (Gs + p * Cs)] * (1 - x)] + Z0 * Sinh[Sqrt[(Rs + p * Ls) * (Gs + p * Cs)] * (1 - x)]) /
              |Kos···|Quadratwurzel |Sinu···|Quadratwurzel
          ((Z1 + Z2) * Cosh[Sqrt[(Rs + p * Ls) * (Gs + p * Cs)] * 1] + (Z0 + Z1 * Z2 / Z0) * Sinh[Sqrt[(Rs + p * Ls) * (Gs + p * Cs)] * 1]);
              |Kos···|Quadratwurzel |Sinu···|Quadratwurzel

```

```
In[31]:= M = 2048; Zeit = 1 / 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[34]:= ListLinePlot[Liste, InterpolationOrder → 3, PlotRange → All, GridLines → Automatic]
```



```
In[35]:= te = UnixTime[] - ta  
         |Unixzeit  
         N[te / 60]  
         |numerischer Wert
```

```
Out[35]= 534
```

```
Out[36]= 8.9
```