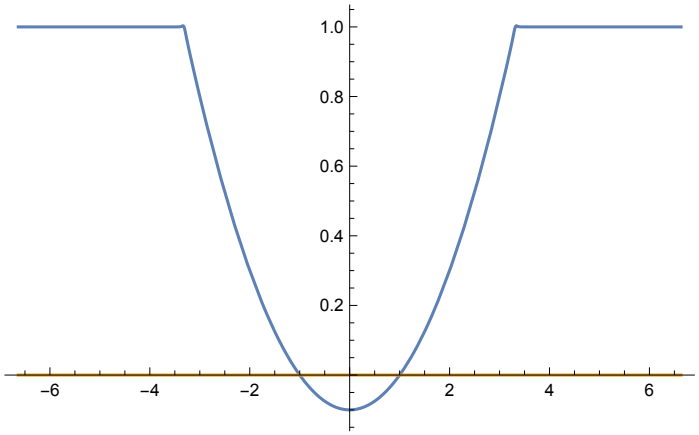
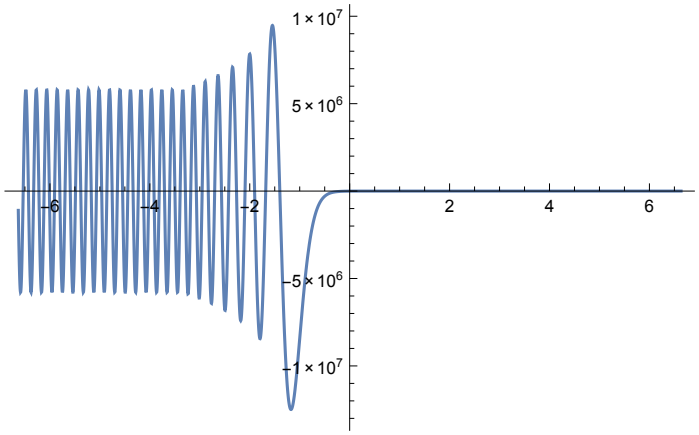
In[2448]:=
```
(*Configuration*)
a = 0.1;
ν = 0.0000001;
n = 100.;

b = (1. + 1. / a) ^ (-n);
Epsilon = Function[x, 1. + (a * (x^2. - 1.) + i * ν - 1.) / (1. + b * x^(2. n))];

X0 = 2. * Sqrt[1. + 1. / a];
Plot[{Re[Epsilon[x]], Im[Epsilon[x]]}, {x, -X0, X0}, PlotRange → Full]

A = 1.;
```

Out[2454]=



In[2520]:=
```
(*TE-wave*)
ETEEquation = {y''[x] + χ^2. * (Epsilon[x] - Sin[θ]^2.) * y[x] == 0.};
ETEInitials = {y[X0] == A, y'[X0] == i * χ * A}
 (* χ=k0*L, where L is a width of the layer *);

ETE = ParametricNDSolveValue[{ETEEquation, ETEInitials}, y, {x, -X0, X0}, {θ, χ}];
Plot[Re[ETE[0., 30.][x]], {x, -X0, X0}, PlotRange → Full]

RTE =
  Function[{θ, χ}, Exp[2. * i * χ * (-X0)] * (i * χ * ETE[θ, χ][-X0] - ETE[θ, χ]'[-X0]) /
     (i * χ * ETE[θ, χ][-X0] + ETE[θ, χ]'[-X0])];
TTE = Function[{θ, χ}, ETE[θ, χ][X0] * Exp[-i * χ * (X0)] *
    (Exp[i * χ * (-X0)] + RTE[θ, χ] * Exp[-i * χ * (-X0)]) / ETE[θ, χ][-X0]];

TEDissipation = Function[{θ, χ}, 1. - Abs[RTE[θ, χ]]^2. - Abs[TTE[θ, χ]]^2.];
TEDissipation[0., 30.]
```

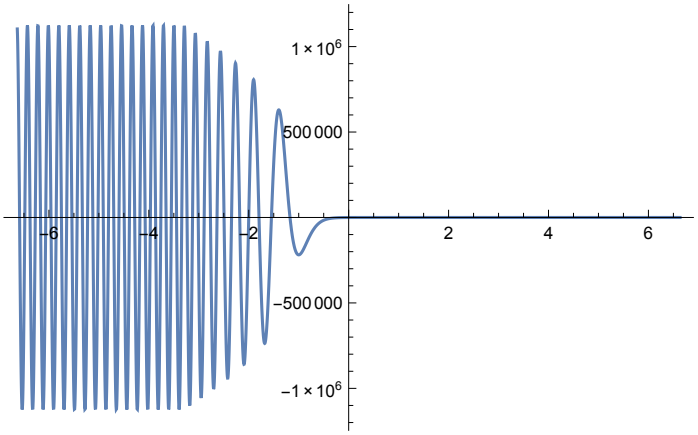
Out[2523]=



Out[2527]= 0.0000356109

In[2528]:=
```
(*TM-wave*)
BTMEquation = {y''[x] - (Epsilon'[x] / Epsilon[x]) * y'[x] +
      χ^2. * (Epsilon[x] - Sin[θ]^2.) * y[x] == 0};
BTMInitials = {y[X0] == -A, y'[X0] == -i * χ * Epsilon[X0] * A * Cos[θ]};

BTM = ParametricNDSolveValue[{BTMEquation, BTMInitials}, y, {x, -X0, X0}, {θ, χ}];
Plot[Re[BTM[0., 30.][x]], {x, -X0, X0}, PlotRange → Full]

RTM =
  Function[{θ, χ}, Exp[2. * i * χ * (-X0)] * (i * χ * BTM[θ, χ][-X0] - BTM[θ, χ]'[-X0]) /
      (i * χ * BTM[θ, χ][-X0] + BTM[θ, χ]'[-X0])];
TTM = Function[{θ, χ}, BTM[θ, χ][X0] * Exp[-i * χ * (X0)] *
     (Exp[i * χ * (-X0)] + RTM[θ, χ] * Exp[-i * χ * (-X0)]) / BTM[θ, χ][-X0]];

TMDissipation = Function[{θ, χ}, 1. - Abs[RTM[θ, χ]]^2. - Abs[TTM[θ, χ]]^2.];
TMDissipation[0., 30.]
```

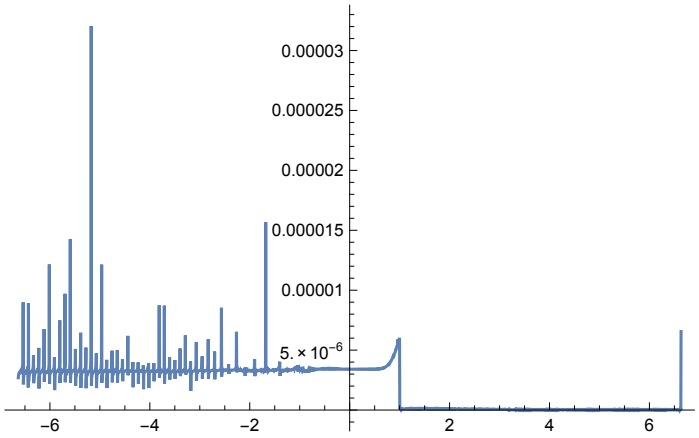
Out[2531]=



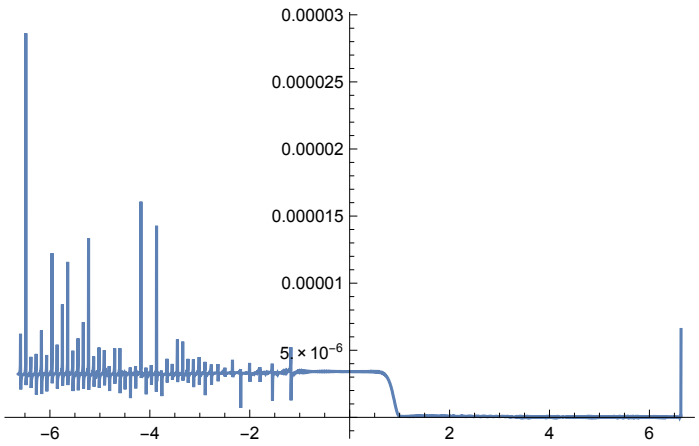
Out[2535]= 0.0000355848

In[2548]:=
```
(*Reletive precision*)
values = {θ → 0., χ → 30.};
ETM = Function[x, i * BTM[θ, χ]'[x] / (χ * Epsilon[x])];
Plot[Abs[ETE[θ, χ][x] - ETM[x]] / Min[Abs[ETE[θ, χ][x]], Abs[ETM[x]]] /. values,
 {x, -X0, X0}, PlotRange → Full]

BTE = Function[x, (-i / χ) * ETE[θ, χ]'[x]];
Plot[Abs[BTE[x] + BTM[θ, χ][x]] / Min[Abs[BTE[x]], Abs[BTM[θ, χ][x]]] /. values,
 {x, -X0, X0}, PlotRange → Full]
```

Out[2550]=



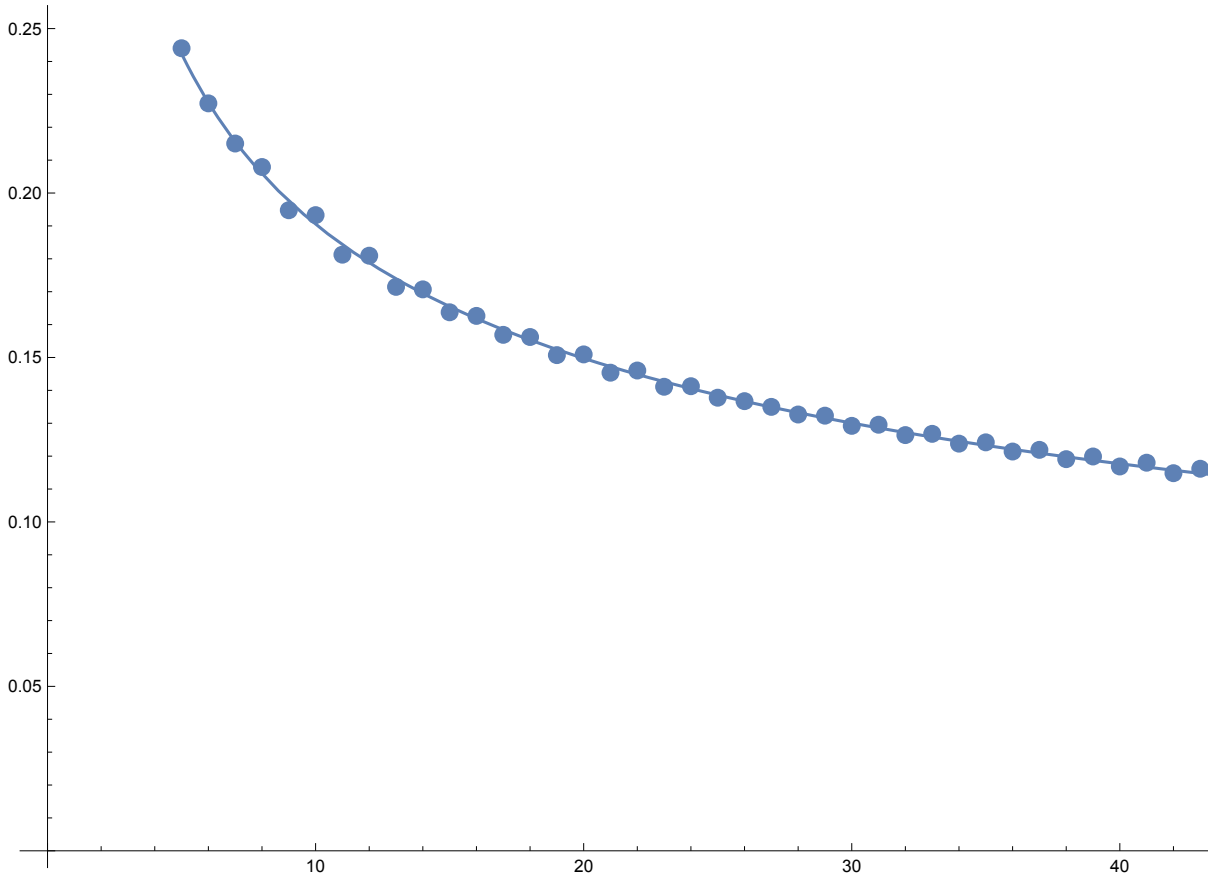
Out[2552]=




```
limits = {χ1 → 5., χ2 → 50.};
Teta = Function[χ, Abs[θ /. NMaximize[TMDissipation[θ, χ], θ][[2]]]];
Data = Table[Teta[x], {x, χ1 /. limits, χ2 /. limits}];
```

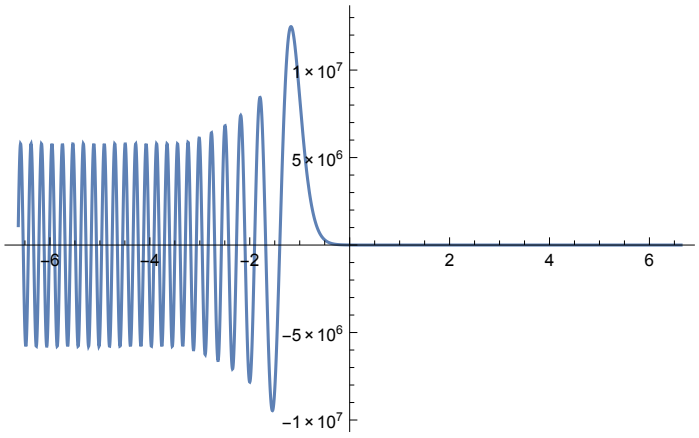
```
points =
  Table[Prepend[{Data[[i]]}, i + (χ1 - 1) /. limits], {i, (χ2 - χ1) /. limits}];
fit = FindFit[points, h * x^m, {m, h}, x]
Experiment = ListPlot[points];
Approximation = Plot[(h * x^m) /. fit, {x, χ1 /. limits, χ2 /. limits}];
Show[Experiment, Approximation, PlotRange -> Automatic]
```

```
{m → -0.347467, h → 0.424015}
```



In[3291]:=
```
(*Anisotropy*)
V = Function[x, 1. - Epsilon[x]];
U = 10^(-3)(* U = |eB/(mcw)|, so for B~1000G U~10^(-10) *);
T = {{i, -i, 0}, {1, 1, 0}, {0, 0, 1}} (*Matrix to diagonalize permittivity*);
P[x_] =
  T.{{1 - V[x] / (1 + U), 0, 0}, {0, 1 - V[x] / (1 - U), 0}, {0, 0, 1 - V[x]}}.Inverse[T]
 (*Permittivity, from diagonal to usual*);

GeneralSystem = {
    (*Ex[x]*P[x][[1,1]]+Ey[x]*P[x][[1,2]]==kz*By[x]-ky*Bz[x],
    Bx[x]==ky*Ez[x]-kz*Ey[x],*)
    Ey'[x] ==
     i * χ * (ky * (kz * By[x] - ky * Bz[x] - Ey[x] * P[x][[1, 2]]) / P[x][[1, 1]] + Bz[x]),
    (*Ey'[x]==i*χ*(ky*Ex[x]+Bz[x])*)
    Ez'[x] == i * χ * (kz * (kz * By[x] - ky * Bz[x] - Ey[x] * P[x][[1, 2]]) /
          P[x][[1, 1]] - By[x]), (*Ez'[x]==i*χ*(kz*Ex[x]-By[x])*)
    By'[x] == i * χ * (ky * (ky * Ez[x] - kz * Ey[x]) - P[x][[3, 3]] * Ez[x]),
    (*By'[x]==i*χ*(ky*Bx[x]-P[x][[3,3]]*Ez[x])*)
    Bz'[x] == i * χ * (kz * (ky * Ez[x] - kz * Ey[x]) +
        P[x][[2, 1]] * (kz * By[x] - ky * Bz[x] - Ey[x] * P[x][[1, 2]]) / P[x][[1, 1]] +
        P[x][[2, 2]] * Ey[x])
    (*Bz'[x]==i*χ*(kz*Bx[x]+P[x][[2,1]]*Ex[x]+P[x][[2,2]]*Ey[x])*)
   } /. {kx → Sin[ϕ] Cos[Θ], ky → Sin[ϕ] Sin[Θ], kz → Cos[ϕ]};

GeneralInitials = {
   (*Ex[X0]==A*(Sin[Θ]Sin[α]-Cos[ϕ]Cos[Θ]Cos[α]),*)
   Ey[X0] == -A * (Cos[Θ] Sin[α] + Cos[ϕ] Sin[Θ] Cos[α]),
   Ez[X0] == A * Sin[ϕ] Cos[α],
   (*Bx[X0]==A*(Sin[Θ]Cos[α]+Cos[ϕ]Cos[Θ]Sin[α]),*)
   By[X0] == A * (Cos[ϕ] Sin[Θ] Sin[α] - Cos[Θ] Cos[α]),
   Bz[X0] == -A * Sin[ϕ] Sin[α]
  };

Solution = NDSolveValue[{GeneralSystem, GeneralInitials} /.
    {χ → 30., Θ → 0., ϕ → π / 2., α → π / 2}, {Ey, Ez, By, Bz}, {x, -X0, X0}];

Eτ = Function[x, If[Solution[[1]][X0] == 0, Solution[[2]][x], Solution[[1]][x] /
     Cos[ArcTan[Abs[Solution[[2]][X0]] / Abs[Solution[[1]][X0]]]]]];
Plot[Re[Eτ[x]], {x, -X0, X0}]

R = Function[χ,
   Exp[2. * i * χ * (-X0)] * (i * χ * Eτ[-X0] - Eτ'[-X0]) / (i * χ * Eτ[-X0] + Eτ'[-X0])];
T = Function[χ, Eτ[X0] * Exp[-i * χ * (X0)] *
    (Exp[i * χ * (-X0)] + R[χ] * Exp[-i * χ * (-X0)]) / Eτ[-X0]];
Dissipation = Function[χ, 1. - Abs[R[χ]]^2. - Abs[T[χ]]^2.];

Dissipation[30]
```

Out[3299]=

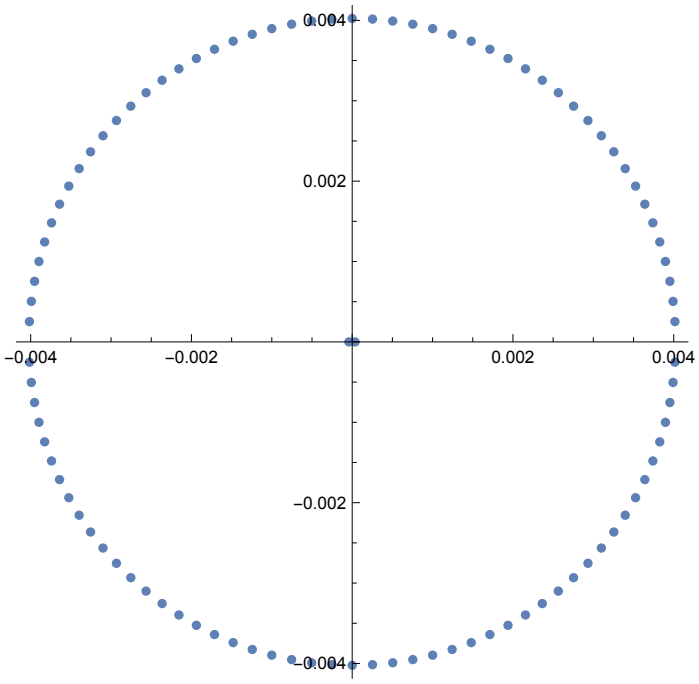


Out[3303]= 0.00402327

In[3318]:=
```
DissipationFromA = {};
begining = 0; end = 2 π; nstep = 100.;
ProgressIndicator[Dynamic[(A - begining) / (end - begining)]]
For[A = begining, A < end, A += (end - begining) / nstep,
  Solution = NDSolveValue[{GeneralSystem, GeneralInitials} /.
      {χ → 30., θ → 0., ϕ → π / 2., α → A}, {Ey, Ez, By, Bz}, {x, -X0, X0}];
  Eτ = Function[x, If[Solution[[1]][X0] == 0, Solution[[2]][x], Solution[[1]][x] /
       Cos[ArcTan[Abs[Solution[[2]][X0]] / Abs[Solution[[1]][X0]]]]]];
  R = Function[χ, Exp[2. * i * χ * (-X0)] * (i * χ * Eτ[-X0] - Eτ'[-X0]) /
      (i * χ * Eτ[-X0] + Eτ'[-X0])];
  T = Function[χ, Eτ[X0] * Exp[-i * χ * (X0)] *
      (Exp[i * χ * (-X0)] + R[χ] * Exp[-i * χ * (-X0)]) / Eτ[-X0]];
  Dissipation = Function[χ, 1. - Abs[R[χ]]^2. - Abs[T[χ]]^2.];
  DissipationFromA = Append[DissipationFromA, {A, Dissipation[30]}];
 ];
ListPolarPlot[DissipationFromA]
```

Out[3320]=

Out[3322]=



In[3313]:=
```
DissipationFromΘ = {};
begining = -0.3; end = 0.3; nstep = 100.;
ProgressIndicator[Dynamic[(Θ - begining) / (end - begining)]]
For[Θ = begining, Θ < end, Θ += (end - begining) / nstep,
  Solution = NDSolveValue[{GeneralSystem, GeneralInitials} /.
      {χ → 30., θ → Θ, ϕ → π / 2., α → π / 2}, {Ey, Ez, By, Bz}, {x, -X0, X0}];
  Eτ = Function[x, If[Solution[[1]][X0] == 0, Solution[[2]][x], Solution[[1]][x] /
       Cos[ArcTan[Abs[Solution[[2]][X0]] / Abs[Solution[[1]][X0]]]]];
  R = Function[χ, Exp[2. * i * χ * (-X0)] * (i * χ * Eτ[-X0] - Eτ'[-X0]) /
       (i * χ * Eτ[-X0] + Eτ'[-X0])];
  T = Function[χ, Eτ[X0] * Exp[-i * χ * (X0)] *
      (Exp[i * χ * (-X0)] + R[χ] * Exp[-i * χ * (-X0)]) / Eτ[-X0]];
  Dissipation = Function[χ, 1. - Abs[R[χ]]^2. - Abs[T[χ]]^2.];
  DissipationFromΘ = Append[DissipationFromΘ, {Θ, Dissipation[30]}];
 ];
ListPlot[DissipationFromΘ]
```

Out[3315]=

Out[3317]=