```
In[5]:= GeneralLinearAnizatropy[α0_, U0_, χ0_, θ0_, β0_, P0_] :=
 Module[{α = α0, U = U0, χ = χ0, θ = θ0, β = β0, P = P0},
  (*α - dissipation, α=ν/ω, ω→ω(1+ⅈα)*)
  (*U - anizatropy: p^2=4πe^2*n/m, b=eB/(mc), v=p^2/ω^2,
  u=b^2/ω^2, and with dissipation: v→v(1-ⅈα), u→U(1-ⅈα)*)
  (*χ - dimensionless wave vector magnitude; χ=k₀L, and L=1*)
  (*θ - ngel between wave vector and XOZ*)
  (*β - angle between wave vector and magnetic field direction*)
  (*P - wave polarisation; 2d-vector*)

  (*==========================================================================
   ============================================*)

  (*Plasma configuration*)
  X = 3; (*plasma boundary*)
  Δ = 0.05; (*smoothing width, in parts of plasma whight*)
  n = 1 / Δ; smoothingFunc = Function[x, (1 - (x/X)^(2 n))^-1];
  v = Function[x, ((X^2 - x^2)/(X^2 - 1)) * smoothingFunc[x] * (1 - ⅈ * α)]; u = U (1 - ⅈ * α);
  Eps = {{1 - v[x]/(1-u), ⅈ Sqrt[u]/(1-u) v[x], 0},
         {-ⅈ Sqrt[u]/(1-u) v[x], 1 - v[x]/(1-u), 0},
         {0, 0, 1 - v[x]}};
  (*Plot[{Re[Eps[[3,3]]],Im[Eps[[3,3]]]},{x,-2X,2X}]*)

  (*==========================================================================
   ============================================*)

  (*Wave configuration*)
  A = 1; (*wave magnitude*)
  k = χ Transpose[{{Cos[θ] Sin[β]}, {Sin[θ]}, {Cos[θ] Cos[β]}}][[1]]; (*wave vector*)
  E = A/Norm[P] {{Cos[β], -Sin[θ] Sin[β]},
                 {0, Cos[θ]},
                 {-Sin[β], -Sin[θ] Cos[β]}}.P;
  (*Electric field (!!!ESCAPE_SEQUENCE!!!)*)
  B = (k × E)/χ; (*Magnetic field (!!!ESCAPE_SEQUENCE!!!)*)

  (*==========================================================================
   ============================================*)

  (*Maxwell equations*)
  GeneralSystem = {
    (*Ex[x]*Eps[x][[1,1]]+Ey[x]*Eps[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] * Eps[[1, 2]])/Eps[[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] * Eps[[1, 2]]) / Eps[[1, 1]] - By[x]),
    (*Ez'[x]==i*χ*(kz*Ex[x]-By[x])*)
    By'[x] == i * χ * (ky * (ky * Ez[x] - kz * Ey[x]) - Eps[[3, 3]] * Ez[x]),
    (*By'[x]==i*χ*(ky*Bx[x]-Eps[x][[3,3]]*Ez[x])*)
    Bz'[x] == i * χ * (kz * (ky * Ez[x] - kz * Ey[x]) + Eps[[2, 1]] *
          (kz * By[x] - ky * Bz[x] - Ey[x] * Eps[[1, 2]]) / Eps[[1, 1]] + Eps[[2, 2]] * Ey[x])
      (*Bz'[x]==i*χ*(kz*Bx[x]+Eps[x][[2,1]]*Ex[x]+Eps[x][[2,2]]*Ey[x])*)
  } /. {kx → k[[1]] / χ, ky → k[[2]] / χ, kz → k[[3]] / χ};

GeneralInitials =
  {Ey[2 X] == E[[2]], Ez[2 X] == E[[3]], By[2 X] == B[[2]], Bz[2 X] == B[[3]]};
Sol = NDSolveValue[{GeneralSystem, GeneralInitials},
   {Ey, Ez, By, Bz}, {x, -2 X, 2 X}];

(*==========================================================================
 ==============================================*)

(*Polarisation rotations*)
Transmitted =
  If[P[[1]] == 0, Conjugate[P[[2]]] / Abs[P[[2]]], Conjugate[P[[1]]] / Abs[P[[1]]]] ({{P[[1]] / Norm[P]}, {P[[2]] / Norm[P]}})ᵀ[[1]];
(*Transmitted wave*)
IW =
  (({{Cos[β], 0, -Sin[β]}, {-Sin[β] Sin[θ], Cos[θ], -Cos[β] Sin[θ]}}) . ({{(kz*By[x]-ky*Bz[x]-Ey[x]*Eps[[1,2]]) / Eps[[1,1]]}, {Ey[x]}, {Ez[x]}}))ᵀ[[
    1]] /. {kx → k[[1]] / χ, ky → k[[2]] / χ, kz → k[[3]] / χ, Ey[x] → Sol[[1]][x],
    Ez[x] → Sol[[2]][x], By[x] → Sol[[3]][x], Bz[x] → Sol[[4]][x]};
IP =
  ({{a /. NSolve[{a * Exp[i * k[[1]] (-2 X)] + b * Exp[-i * k[[1]] (-2 X)] == IW[[1]] /. x →
    {a /. NSolve[{a * Exp[i * k[[1]] (-2 X)] + b * Exp[-i * k[[1]] (-2 X)] == IW[[2]] /. x →
     })ᵀ[[1]];
Initial =
  If[IP[[1]] == 0, Conjugate[IP[[2]]] / Abs[IP[[2]]], Conjugate[IP[[1]]] / Abs[IP[[1]]]] ({{IP[[1]] / Norm[IP]}, {IP[[2]] / Norm[IP]}})ᵀ[[1]];
(*Initial wave*)
RW = (({{Cos[π - β], 0, -Sin[π - β]}, {-Sin[π - β] Sin[-θ], Cos[-θ], -Cos[π - β] Sin[-θ]}}) .
       ({{(kz*By[x]-ky*Bz[x]-Ey[x]*Eps[[1,2]]) / Eps[[1,1]]}, {Ey[x]}, {Ez[x]}}))ᵀ[[1]] /.
   {kx → k[[1]] / χ, ky → k[[2]] / χ, kz → k[[3]] / χ, Ey[x] → Sol[[1]][x],
    Ez[x] → Sol[[2]][x], By[x] → Sol[[3]][x], Bz[x] → Sol[[4]][x]};
```

```
RP =
 (b /. NSolve[{a * Exp[ⅈ * k[[1]] (-2 X)] + b * Exp[-ⅈ * k[[1]] (-2 X)] == RW[[1]] /. x →
  b /. NSolve[{a * Exp[ⅈ * k[[1]] (-2 X)] + b * Exp[-ⅈ * k[[1]] (-2 X)] == RW[[2]] /. x →
   )ᵀ[[1]];
Reflected =
  If[RP[[1]] == 0, Conjugate[RP[[2]]] / Abs[RP[[2]]], Conjugate[RP[[1]]] / Abs[RP[[1]]]] (RP[[1]] / Norm[RP]
                                                                                          RP[[2]] / Norm[RP])ᵀ[[1]];
(*Reflected wave*)
(*Dissipation*)
Dissipation = 1 - Norm[RP] / Norm[IP];

(*==========================================================================
 ===============================================*)

{Eps, k, Sol, Initial, Reflected, Transmitted, Dissipation}

]
```

In[102]:=

```
DissipationFromΘ = {};
begining = -π / 4; end = π / 4; nstep = 100;
ProgressIndicator[Dynamic[(Θ - begining) / (end - begining)]]
For[Θ = begining, Θ < end, Θ += (end - begining) / nstep,
  DissipationFromΘ = Append[DissipationFromΘ,
     {Θ, GeneralLinearAnizatropy[0.000001, 0.000001, 30, Θ, π/2, {0, 1}][[7]]}];
 ];
ListPlot[DissipationFromΘ, PlotRange → Full]
```

Out[104]= [redacted]

Out[106]=