Tunneling through a fluctuating barrier: Two-level model

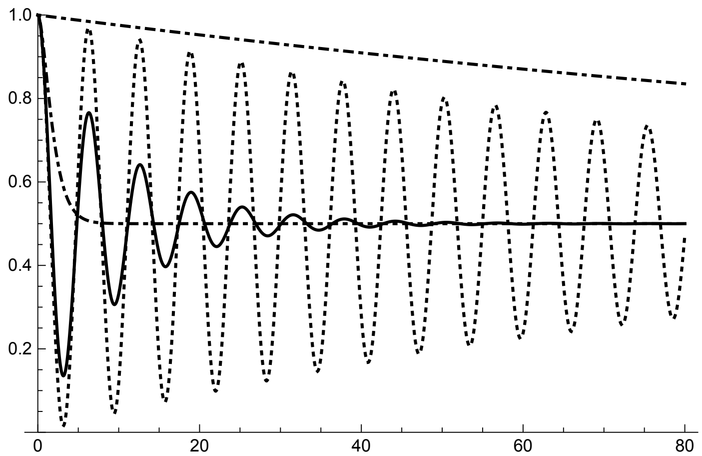
Informal supplementary Mathematica.NB

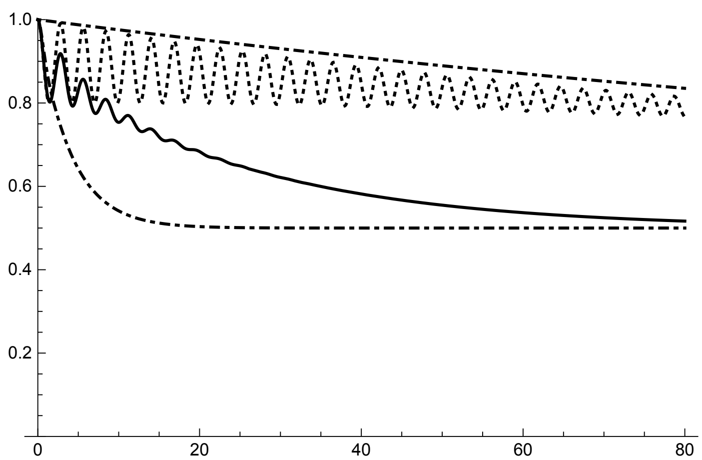
"https://journals.aps.org/pre/abstract/10.1103/PhysRevE.61.4890"

```
SapiroLoginov[{κ_, ϵ_, Δ0_, Δ1_, ν_}, initC_, tf_] := Block[{A, R, t, init, out},
   A = {
     {-2 κ, -ϵ, 0, 0, 0, 0},
     {ϵ, -2 κ, Δ0, 0, 0, Δ1},
     {0, -Δ0, 0, 0, -Δ1, 0},
     {0, 0, 0, -2 κ - 2 ν, -ϵ, 0},
     {0, 0, Δ1, ϵ, -2 κ - 2 ν, Δ0},
     {0, -Δ1, 0, 0, -Δ0, -2 ν}
    };
   init = PadRight[initC, 6];
   NDSolveValue[{R'[t] == A.R[t], R[0] == init}, R, {t, 0, tf}]
  ];
(*eq 3 (a.b.c)*)
(*{κ_,ϵ_,Δ0_,Δ1_,ν_}
 list of paramter*)
(*initC_
 list of numbers of same 3b automatic are zero Padding to right *)
```

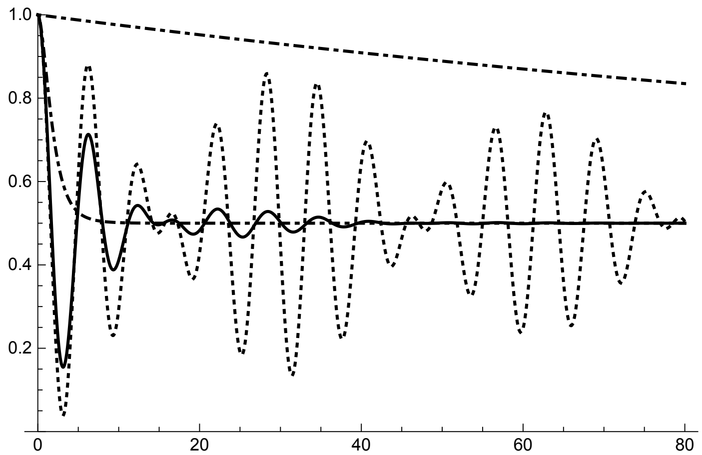
```
(*genetat fig for 4 parameter*)
plotFig4[Δ1_, ϵ_] := Block[{Δ0 = 1, ν = 0,
   κ, sol, p, pl1, pl2, pl3, pl4},

  (*----------------------------------------*)
  κ = .01;
  sol = SapiroLoginov[{κ, ϵ, Δ0, Δ1, ν}, {0, 0, 1}, 80];
  p[t_] := .5 (sol[t][[3]] + 1);
  pl1 = Plot[p[t], {t, 0, 80}, PlotRange → {0, 1}, PlotStyle → {Dotted, Black}];
  (*----------------------------------------*)
  κ = .1;
  sol = SapiroLoginov[{κ, ϵ, Δ0, Δ1, ν}, {0, 0, 1}, 80];
  p[t_] := .5 (sol[t][[3]] + 1);
  pl2 = Plot[p[t], {t, 0, 80}, PlotRange → {0, 1}, PlotStyle → {Black}];
  (*----------------------------------------*)
  κ = 1;
  sol = SapiroLoginov[{κ, ϵ, Δ0, Δ1, ν}, {0, 0, 1}, 80];
  p[t_] := .5 (sol[t][[3]] + 1);
  pl3 = Plot[p[t], {t, 0, 80}, PlotRange → {0, 1}, PlotStyle → {DotDashed, Black}];
  (*----------------------------------------*)
  κ = 100;
  sol = SapiroLoginov[{κ, ϵ, Δ0, Δ1, ν}, {0, 0, 1}, 80];
  p[t_] := .5 (sol[t][[3]] + 1);
  pl4 = Plot[p[t], {t, 0, 80}, PlotRange → {0, 1}, PlotStyle → {DotDashed, Black}];
  (*----------------------------------------*)
  Show[pl1, pl2, pl3, pl4]]
```

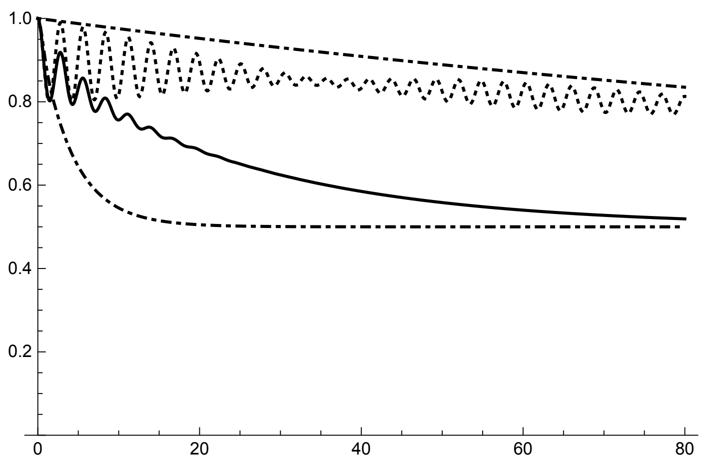
```
(*fig 1 a*)
Δ1 = 0; ϵ = 0;
plotFig4[Δ1, ϵ]
(*fig 1 b*)
Δ1 = 0; ϵ = 2;
plotFig4[Δ1, ϵ]
```





```
(*fig 2 a*)
Δ1 = .1; ϵ = 0;
plotFig4[Δ1, ϵ]
(*fig 2 b*)
Δ1 = .1; ϵ = 2;
plotFig4[Δ1, ϵ]
```





```
(*fig 1 a*)
Δ1 = .95; ϵ = 0;
plotFig4[Δ1, ϵ]
(*fig 1 b*)
Δ1 = .95; ϵ = 2;
plotFig4[Δ1, ϵ]
```