

Track3P Sample Inputs

Table of Contents

1 An example for Track3P multipacting computation on a single field level. Field gradient: 97e+06
2 An example of multipacting simulation on a field level scan case
3 An example of tracking particles simulation with only one impact information
4 An example for Track3P dark current simulation for 90 degree square bend structure

An example for Track3P multipacting computation on a single field level. Field gradient: 97e+06

```
// If you don't give this block, it will use default value
ParticlesTrajectories: // record particles' trajectory, only for running single
                        //field case
{
  ParticleFile: p      // file name
  Skip: 10             // write file each 10 steps
  Start: 10            // start time step for writing file
  Stop: 100000         // stop time step for writing file
}

FieldScales:
{
  Type: FieldGradient // Three types, FieldGradient (v/m); InputPortPower (W); StoreEnergy
  ScanToken: 0 // 1: scan, 0: no scan
  Scale: 97e+06 //field scale for particle trajectory
}

//Normalize field, only for closed waveguide case
NormalizedField:
{
  StartPoint: 0 0 0.0486225 //start point of the line for field integral calculation
  EndPoint: 0 0 0.2061 //end point of the line for field integral calculation
}

// Primary particles emission

Emitter:
{
  x0: -0.001
  x1: 0.001
  y0: 0.09
  y1: 0.12
  z0: -0.068
  z1: 0.068
  BoundaryID: 6
}

Material:{
  Type: Primary
  BoundarySurfaceID: 6 //Boundary surface ID
}

Material:{
  Type: Secondary
  BoundarySurfaceID: 6 //Boundary surface ID
}

Material:{
  Type: Absorber
  BoundarySurfaceID: 3 4 7 8 //Boundary surface ID
}

Material:{
  Type: SymmetryPlane
  BoundarySurfaceID: 1 2 //Boundary surface ID
}

OutputImpacts: on
```

```
// Field information container
Domain:
{
  PostprocessFile: ./vector1/postprocess.in
  Bins: 250
}

Postprocess: // multipacting postprocess
{
  Toggle: on // on: postprocess, off: no postprocess
  ResonantParticles: // postprocess for resonant particles
  {
    Token: on // on: analysis resonant particles, no: no analysis is done for resonant particles
  }
}
```

An example of multipacting simulation on a field level scan case

```

// Field level(V/m) / Port power(W)
FieldScales:
{
  Type: FieldGradient
  ScanToken: 1 // 1: scan, 0: no scan
  Minimum: 1e+06
  Maximum: 100e+06
}

//Normalize field, only for closed waveguide case
NormalizedField:
{
  StartPoint: 0 0 0.0486225 //start point of the line for field integral calculation
  EndPoint: 0 0 0.2061 //end point of the line for field integral calculation
}

// Primary particles emission

Emitter:
{
  x0: -0.001
  x1: 0.001
  y0: 0.09
  y1: 0.12
  z0: -0.068
  z1: 0.068
  BoundaryID: 6
}

Material:{
  Type: Primary
  BoundarySurfaceID: 6 //Boundary surface ID
}

Material:{
  Type: Secondary
  BoundarySurfaceID: 6 //Boundary surface ID
}

Material:{
  Type: Absorber
  BoundarySurfaceID: 3 4 7 8 //Boundary surface ID
}

Material:{
  Type: SymmetryPlane
  BoundarySurfaceID: 1 2 //Boundary surface ID
}

OutputImpacts: on
// Field information container
Domain:
{
  PostprocessFile: ./vector1/postprocess.in
  Bins: 360
}

Postprocess: // multipacting postprocess
{
  Toggle: on // on: postprocess, off: no postprocess
  ResonantParticles: // postprocess for resonant particles
  {
    Token: on // on: analysis resonant particles, no: no analysis is done for resonant particles
  }
}

```

An example of tracking particles simulation with only one impact information

```

TotalTime: 3 //total running time in RF cycles, default: 20 RF cycle

// Field level(V/m) / Port power(W)
FieldScales:
{
  Type: FieldGradient
  ScanToken: 0 // 1: scan, 0: no scan
  Scale: 97e+06 //field scale for particle trajectory
}

//Normalize field, only for closed waveguide case
NormalizedField:
{
  StartPoint: 0 0 0.0486225 //start point of the line for field integral calculation
  EndPoint: 0 0 0.2061 //end point of the line for field integral calculation
}

// Primary particles emission

Emitter:
{
  t0: 0 //time(in RF cycle) for start emission
  t1: 1 //time(in RF cycle) for end emission
  Type: 4
  Position: 4.0388e-4 4.63728e-3 6.49586e-2
  BoundaryID: 6
}

Material:{
  Type: Primary
  BoundarySurfaceID: 6 //Boundary surface ID
}

Material:{
  Type: Secondary
  BoundarySurfaceID: 6 //Boundary surface ID
}

Material:{
  Type: Absorber
  BoundarySurfaceID: 3 4 7 8 //Boundary surface ID
}

Material:{
  Type: SymmetryPlane
  BoundarySurfaceID: 1 2 //Boundary surface ID
}

OutputImpacts: on
// Field information container
Domain:
{
  dt: 0.5
  PostprocessFile: ./vector1/postprocess.in
  MaxImpacts: 1
  Bins: 300
}

Postprocess: // multipacting postprocess
{
  Toggle: on // on: postprocess, off: no postprocess
  ResonantParticles: // postprocess for resonant particles
  {
    Token: off // on: analysis resonant particles, no: no analysis is done for resonant particles
    InitialImpacts: 4 // particles with impacts number greater than initial impacts are considered, default is 4
    EnergyRange: 10 10000 //particles with impact energy fall in this region is considered, default value:
    >10ev, <10000ev
  }
  DKSingleEmit:
  {

```

```
Token: on
FileName: DKSingleEmit
SymmetryBoundaryIDs: 1 2
}
```

An example for Track3P dark current simulation for 90 degree square bend structure

```

TotalTime: 20

ParticlesTrajectories:
{ ParticleFile: p
  Skip: 10
  // Start: 500
  // Stop: 2500
}

FieldScales:
{
  Type: InputPortPower
  ScanToken: 1 // 1: scan, 0: no scan
  Minimum: 72e+06
  Maximum: 72e+06
  Interval: 1e+06
  Scale: 213e+06 //field scale for particle trajectory
}

Emitter:
{
  t0: 0
  t1: 20.0
  Type: 7 //dark current type (field emission)
  BoundaryID: 6
  N: 3 // number of unit particles in the macroparticle
  M: 9.108e-31 // real mass of a unit particle
  Q: -1.602e-19
  d: .000001
  WorkFunction: 4.4
  Beta: 120
  SuppressionFactor: 2.0
  //WriteToFile: 1

// x y z directions limitation
x0: 0.0
x1: 0.025
y0: -0.1
y1: 0.2
z0: -0.2
z1: 0.1
}

OutputImpacts: on // write out impact energy infor.

Material:
{
  Type: 3 //second partticle following SEY curve
  BoundarySurfaceID: 6
  // WriteToFile: 1
  N: 100
  M: 9.108e-31 // real mass of a unit particle
  Model: 2
  N: 3
  Sigma0: 0.0 0.25 0.47 0.66 0.83 0.97 1.08 1.17 1.25 1.3 1.34 1.4 1.37 1.31 1.24 1.19 1.14 1.09 1.06 1.03
1.0 0.97 0.95 0.93 0.91 0.89 0.87 0.85 0.84 0.83 0.81 0.79 0.77 0.75 0.73
  Einit: 0.0 50 100 150 200 250 300 350 400 450 500 700 900 1100 1300 1500 1700 1900 2100 2300
2500 2700 2900 3100 3300 3500 3700 3900 4100 4300 4500 4900 5300 5700 6100
}

```