

SIMION 8.1 Enhanced Refine Examples

Here are a few examples demonstrating the accuracy improvements possible via the SIMION 8.1 "enhanced refine".

First, this example is of two parallel plates, separated by 20 grid units and tilted at a 20° angle, which is known uniform theoretical field, providing a simple test of accuracy. The discretization of the tilted surface on a rectilinear grid at this low grid resolution introduces noticeable accuracy loss in SIMION 8.0 but is significantly reduced in SIMION 8.1.

```

; SIMION geometry - two parallel plates at angle
pa_define(101,201,1,planar,non-mirrored)
locate(50,100,0, 1, 0,20) {
  e(1) { fill { within { box2d(-20, -1000, -10, 1000) }}}
  e(2) { fill { within { box2d( 20, -1000, 10, 1000) }}}
}
    
```

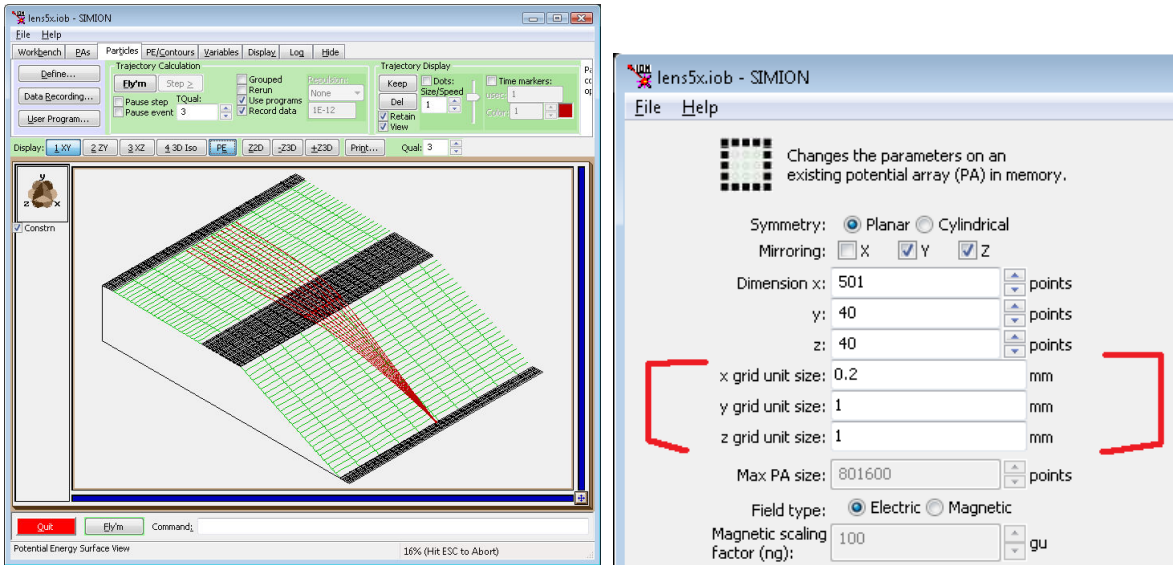
(left) SIMION 8.0 contours - average field error 1%

(right) SIMION 8.1 contours - average field error 0.005%

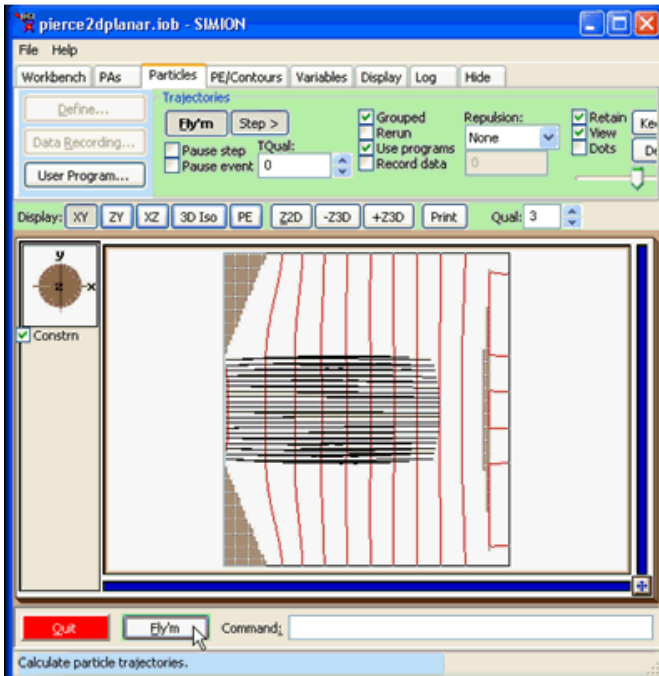
The next example is of a RF quadrupole mass filter with ideal hyperbolic electrodes and **only 40 grid unit inter-rod radius** (quite amenable to 3D simulation). Errors in potentials are reduced from ~ 0.2% to only 0.004%, allowing simulations of resolutions above 1000.

A few other SIMION 8.1 PA/Refine Enhancements

Here's a few other enhancements (partial list) being added into 8.1.



Grid cells can now be rectangular rather than square.



A Poisson solver and other Refine extensions are being included.

```
local pa = simion.pas[1] -- Get first SIMION PA in memory.
v = pa:potential(10,20,0) -- get potential
pa:potential(10,20,0, v) -- set potential
```

SIMION potential arrays, workbenches, PA instances, and GEM files can now be accessed and manipulated from Lua, allowing many new novel techniques.

And more! Features that have been announced are summarized at <http://simion.com/issue/421>.