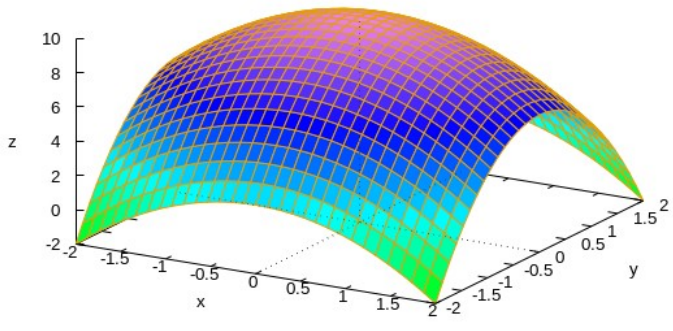
```
/* Some examples of planar vector fields.
   All the graph of the fields are displayed outside of thhis file.
   If you click on any point (a,b) on the field,
   you can see the red-colored integral curve passing through at (a,b).
   1. [-2*x,-4*y]
      the gradient vector field of f(x,y)=10-x^2-2*y^2
   2. [x+2*y,2*x-y]
      given by the quadratic complex velocity potential
      (1-2*%i)*(x+iy)^2/2
   3. [x/r^2,y/y^2], the line source
      given by the complex velocity potential log(x+%i*y)
   4. [y/r^2,-x/y^2], the line vortex
      given by the complex velocity potential %i*log(x+%i*y)
   5. [(x+y)/r^2,(-x+y)/y^2],
      the superposition of line source and line vortex
      given by the complex velocity potential (1+)%i)*log(x+%i*y)
   6. [-(x-5),-y]/((x-5)^2+y^2)
     +[(x+5),y]/((x+5)^2+y^2),
      a dipole which is the superposition of
      negative and positive line sources,
      given by the complex velocity potential
      -log(x-1/2+5i*y)+log(x+1/2+%i*y). */
```

```
/* Load the package of describing planar vector fields.
   "xmaxima" must be installed. */
load("plotdf")$
```

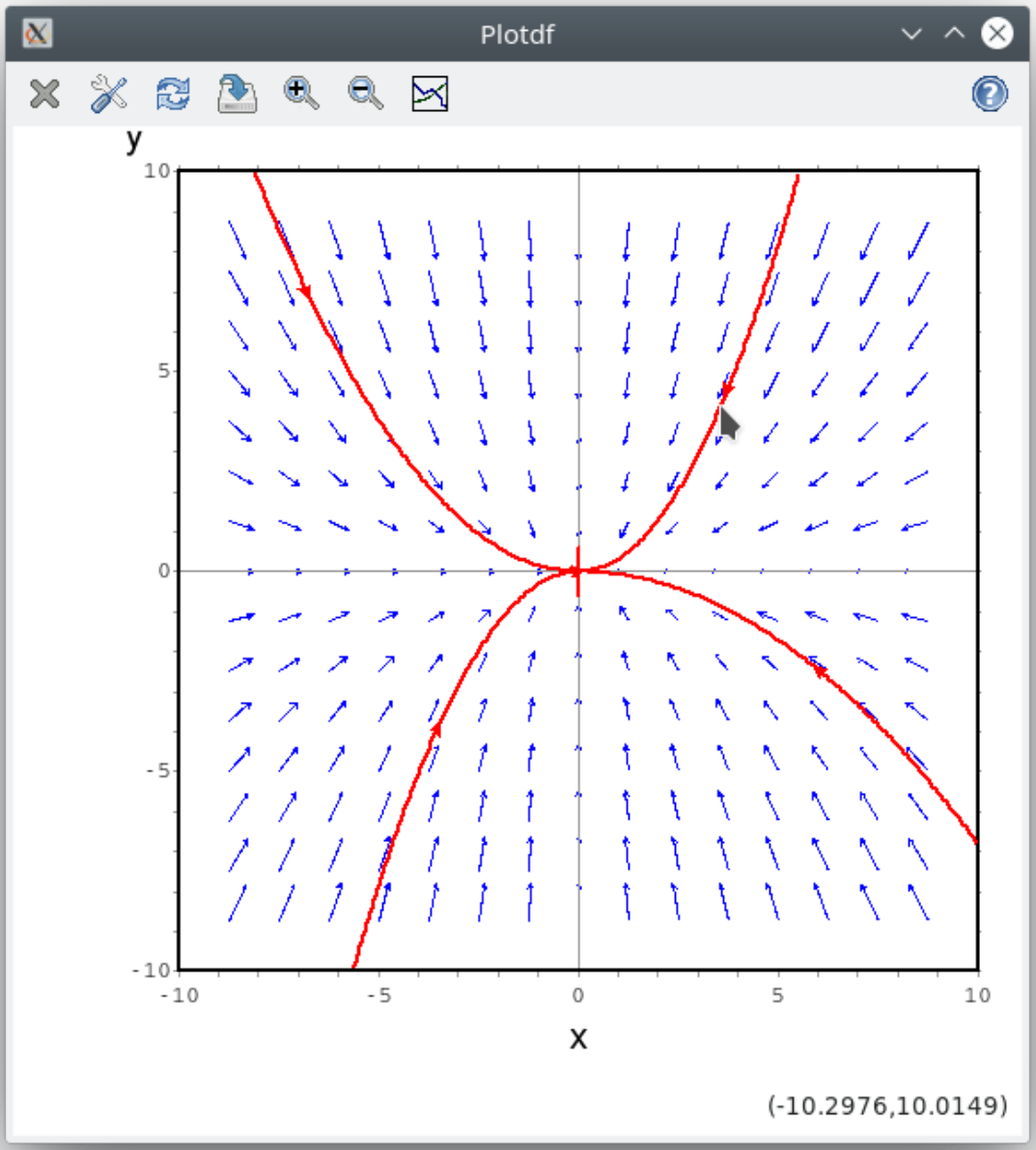
```
/* 1. the graph of a function 10-x-2-2*y^2
   and its gradient vector field [-2*x,-4*y] */
wxplot3d(10-x^2-2*y^2,[x,-2,2],[y,-2,2],
    [legend, false],[title,"10-x^2-2*y^2"]);
plotdf([-2*x,-4*y]);
```

(%t21)

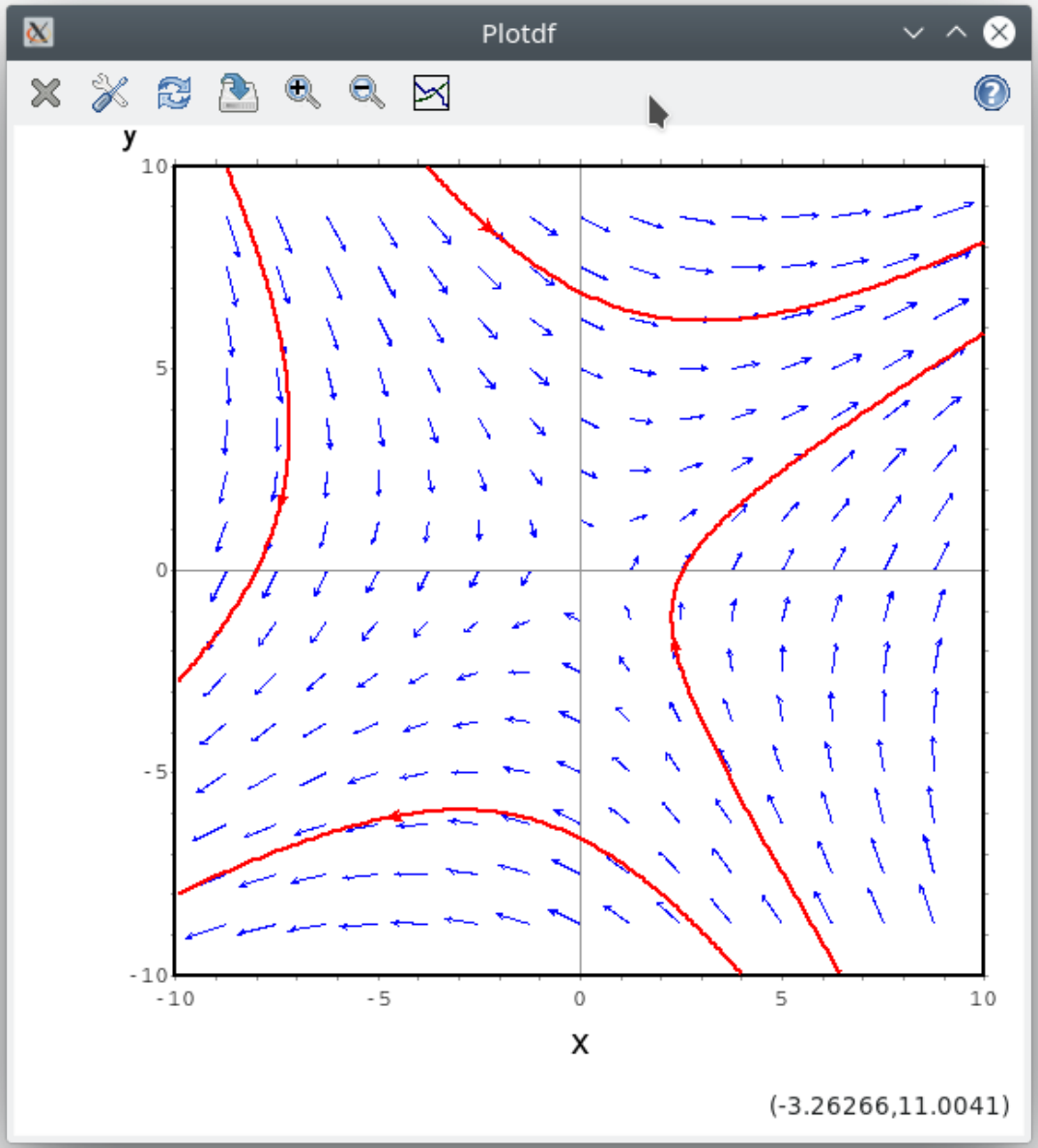


(%o21)

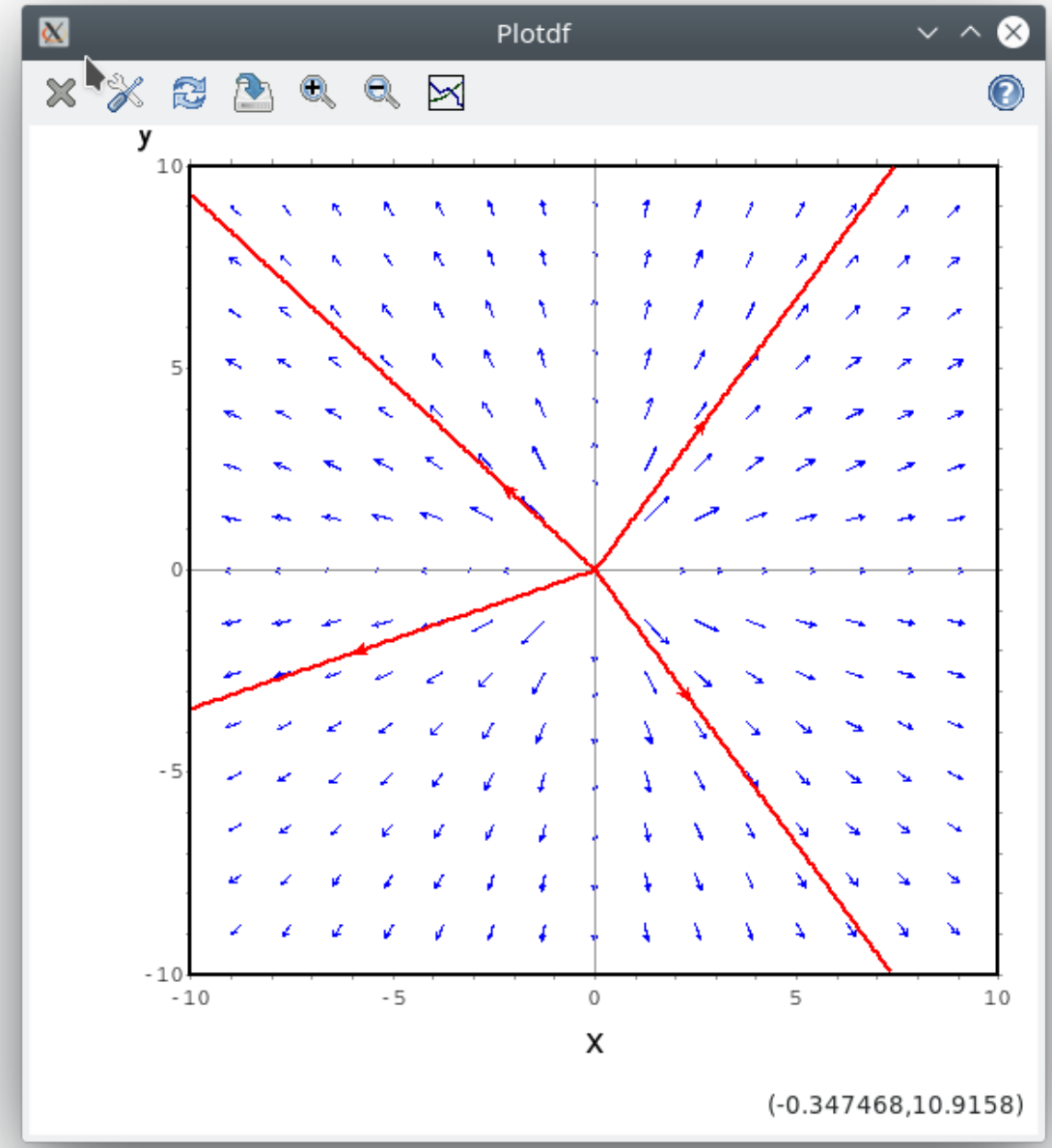
(%o22) */tmp/maxout11376.xmaxima*


Plotdf
y
10
5
0
-5
-10
-10
-5
0
5
10
x
(-10.2976,10.0149)

```
→       /·2. [x+2·y,2·x-y] given by
            the complex velocity potential (1-2·%i)·(x+iy)^2/2·/
        plotdf([x+2·y,2·x-y]);
(%o23)  /tmp/maxout11376.xmaxima
```

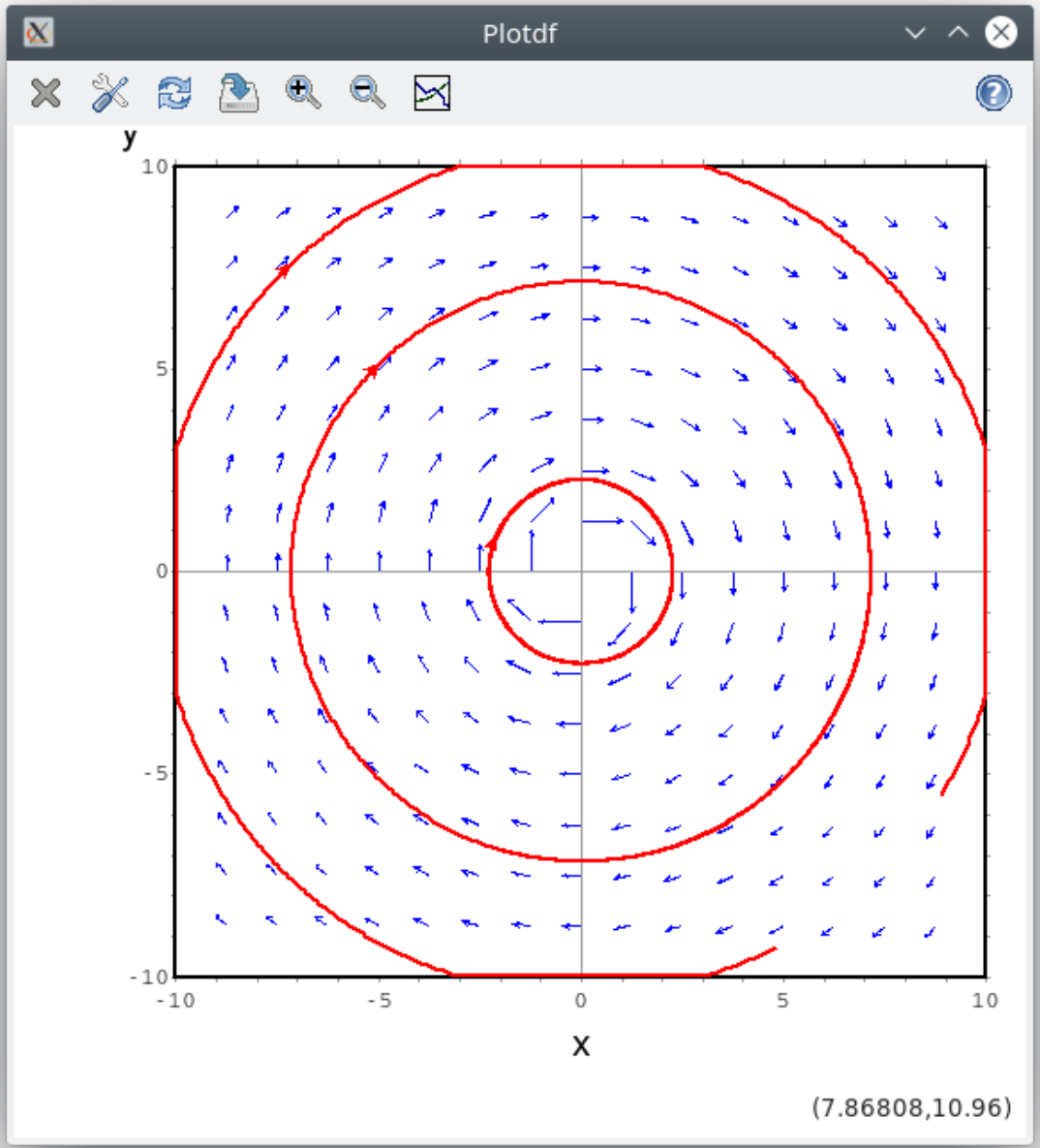


```
→     /*3. [x/r^2,y/r^2], the line source given by
          the complex velocity potential log(x+%i*y) .
          This is modified to resolve a singularity at the origin.*/
      plotdf([x/(x^2+y^2+1/1000),y/(x^2+y^2+1/1000)]);
(%o28) /tmp/maxout11376.xmaxima
```

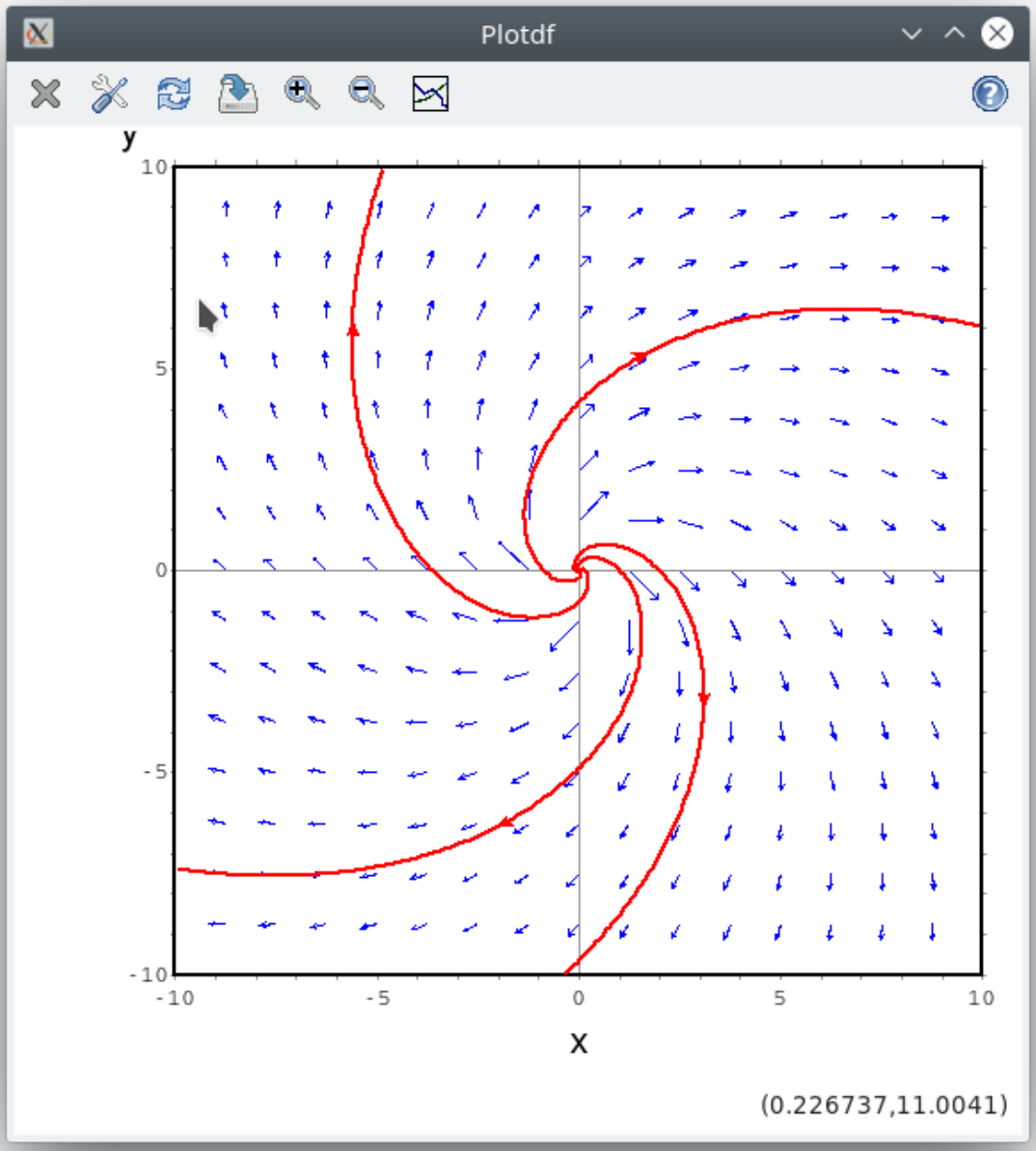


→ /*4. [y/r^2,-x/r^2], the line vortex
given by the complex velocity potential %i*log(x+%i*y).
This is modified to resolve a singularity at the origin.*/
plotdf([y/(x^2+y^2+1/1000),-x/(x^2+y^2+1/1000)]);

(%o29) */tmp/maxout11376.xmaxima*



```
→     /* 5. [(x+y)/r^2,(-x+y)/r^2],
          the superposition of line source and line vortex
          given by the complex velocity potential (1+)%i) * log(x+%i * y).
          This is modified to resolve a singularity at the origin. */
      plotdf([(x+y)/(x^2+y^2+1/1000),(-x+y)/(x^2+y^2+1/1000)]);
(%o30) /tmp/maxout11376.xmaxima
```



```
→    /* 6. [-(x-5),-y]/((x-5)^2+y^2)+[(x+5),y]/((x+5)^2+y^2),
        a dipole which is the superposition of negative and positive line sources,
        given by the complex velocity potential -log(x-5+5i*y)+log(x+5+%i*y). */
plotdf([-(x-5)/((x-5)^2+y^2+1/1000)+(x+5)/((x+5)^2+y^2+1/1000),
        -y/((x-5)^2+y^2+1/1000)+y/((x+5)^2+y^2+1/1000)]);
(%o38) /tmp/maxout11376.xmaxima
```