The algorithm “marching squares” for PSTricks v0.6

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1 The command $\texttt{psContourPlot}[\texttt{options}](x1,y1)(x2,y2)$

If you do not know “marching squares”, the article that Wikipedia devotes to him, very nicely illustrated, seems to me very complete:

https://en.wikipedia.org/wiki/Marching_squares

This is an adaptation of this algorithm to PSTricks, used in $\texttt{psContourPlot}[\texttt{options}]$ and has the following options:

1. $[\texttt{function=}]]$: implicit function $f(x,y)$ of the curve in algebraic or postscript mode, it should be noted that the postscript mode is the fastest;
2. $(x1,y1)(x2,y2)$: coordinates of the lower left corner and the upper right corner of the study frame, as for $\texttt{psframe}(x1,y1)(x2,y2)$;
3. $[a=0.025]$: side of a (square) cell;
4. $[\texttt{grid=false}]$: set to true to draw the cell grid;
5. $[\texttt{Fill=false}]$: set to true to color the interior with the PSTricks option $[\texttt{fillcolor}]$;
6. $[\texttt{ReverseColors=false}]$: coloring inside an object is only valid for one object (a circle for instance). If there are several objects (see the 2 examples of the metaballs) it is the outside which is colored. Set to true this boolean to correct the problem.
7. $[\texttt{ChoicePoints= liste de numéros de points}]$: here we place the points where there will be an arrow on the curve, we indicate a negative value if for the positive value the arrow is not in the desired direction;
8. $[\texttt{WriteData}]$: boolean option allowing to save the coordinates of the points, the name of the file can be chosen with the option $[\texttt{FileName=PointsCurve}]$.

To solve the 2 ambiguous cases of the algorithm, I adopted the solution proposed by Xiaoqiang Zheng and Alex Pang:


A second command $\texttt{psReadData}[\texttt{FileName=}...]$ allow us to draw a registered curve, the $[\texttt{Fill}]$ option is not allowed.

$^1$Its name comes from Mathematica:ContourPlot.
2 Examples

2.1 Circle

\psContourPlot[algebraic,a=0.5,linecolor=red,grid,function=x^2+y^2-16,showpoints,ChoicePoints=-4 120 -45,WriteData,FileName=circle](-4,-4)(4,4)

This grid contains 16 cells along the 2 axes, the side of each is 0.5 cm.

2.2 Coloring inside an object

\psContourPlot[unit=0.5,algebraic,a=0.4,lin color=blue, Fill, fillcolor=red, function=x*(x^2+y^2)-10*(x^2-y^2),grid](-10,-8)(10,8)
2.3 2D metaballs

\begin{animateinline}[controls,palindrome,begin={\begin{pspicture}(-8,-4)(8,4)},end={\end{pspicture}}]{5}% 5 image/s
\multiframe{50}{r=-2+0.08}{% \multiframe{50}{r=-2+0.08}{%
\psframe*(-6.4,-4)(6.4,4)
\pstVerb{/xC \r\space def
/FonctionMetaballs {
1 x xC sub dup mul y dup mul add sqrt div
0.5 x xC add dup mul y dup mul add sqrt div
add
1 sub
} def}%
\psContourPlot[unit=2,a=0.1,linewidth=0.025,linecolor=red,fillcolor=cyan,Fill,ReverseColors,
function=FonctionMetaballs](-8,-4)(8,4)
\psdots(! xC 2 mul 0)(! xC neg 2 mul 0)}
\end{animateinline}
2.4 The field lines of an Hertzian dipole
3 Complements

Examples are included in the documentation, but you will find other examples on the blog:

http://pstricks.blogspot.com/

and as an application dedicated to physics, the drawing of magnetic field lines of parallel wires: