Subject: Re: Is there a simple way to plot field lines?
Posted by mvukovic on Wed, 28 May 2003 23:29:28 GMT
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so@cp.dias.ie (Steve) wrote in message
news:<178496d6.0305280522.5db923d4@posting.google.com>...
> "Mark Hadfield" <m.hadfield@niwa.co.nz> wrote in message
news:<bb12dfqan1@newsreader.mailgate.org>...
>> "Steve" <so@cp.dias.ie> wrote in message
>> news:178496d6.0305271647.468088fa@posting.google.com...
>>> I would like to plot field lines but there coesn't seem to be an
>>> intrinsic function which can do it. This seems hard to believe, am I
>>> mistaken?
>>
>> What do you mean by "plot field lines". If you have (x,y) coordinates
>> defining your lines, then PLOT them. Or do you want to plot isolines for a
>> scalar field? Or lines in 3D space? Or cows walking along lines in fields?
>
> Ouch. Well I guess I should have been more explicit to. I mean field
> lines which are everywhere tangent to a vector field (2d is fine
> thanks), also known as streamlines for velocity fields. I don't want
> arrows anywhere. Or cows.

This seems to me a problem to which there is no magic bullet. What
you seem to be looking for really, is to obtain a function of your
coordinates, such that contours of that function are the streamlines
from your data.

Another (more defined) approach would be to set-up a PDE for your
streamlines, with the right hand side being derived from your data
(interpolated at the points where the PDE is being solved for)

dx/ds = cos(alpha)
dy/ds = sin(alpha)

where alpha is the angle of the streamline with respect to x and s is
the arclength.

Then you would solve the PDE for some starting point, and follow it to
obtain a streamline. The PDE may be re-cast as on ODE

dx/dy = tan(alpha)

However, this may fail if you have looping streamlines.

Summarizing, this is more of a problem of data analysis and number
crunching than just plotting. But it sure sounds fun!