
Subject: Re: Vector Field Plot on Irregular Grid
Posted by [Randy Zagar](#) on Thu, 04 Dec 1997 08:00:00 GMT
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Mike Wiltberger wrote:

>
> Hello,
> I would like to make a vector field plot of some 2d electric field
> data. The problem is that the data was computed on an irregular grid
> and the routines within idl only allow for regular grids. Has anyone
> written a routine to do this with irregular grids?
>

I wrote this for PV-Wave some time ago, but I don't think I used anything that won't also work in IDL. I should also warn you that you may have to experiment with the SymSize option as this routine does not do any pre-scaling of the input data...

Correction: There is one section of this program that uses PV-Wave Date/Time structures. If you are using IDL, you should comment out this part...

```
**** cut here ****
; TO DO:
;   - Legends (hard)
;
; PROCEDURE STICKPLOT, U, V
; PROCEDURE STICKPLOT, X, U, V
; PROCEDURE STICKPLOT, X, Y, U, V
; PROCEDURE STICKPLOT, DT, U, V (Eliminate this part if you're using
IDL)
;
;   The best method for plotting vectors is to make a user-defined
;   symbol for each vector that is plotted... This is the only way
;   I have found to insure that the vectors' angle is preserved
;   no matter how the plot is scaled...
;
;   This procedure can be called in one of two ways:
;   - for plotting a vector time-series, or
;   - for plotting vectors in a 2-D plane
;
; Plotting Vector Time-Series:
;   STICKPLOT, dates, u, v
;   The 'dates' variable is an array of date/time structures, and
'u', 'v'
;   are the two components of the vector. The horizontal axis will
be
;   a standard PV-Wave date/time axis and my plans are to support
```

```

all
;   options relating to these types of plots.
;
;
; Plotting Vector Fields:
;   STICKPLOT, X, Y, U, V
;
;
; INPUTS:
;   DT      An array of Date/Time structures...
;   X       The X coordinate for the vectors' starting point.
;   Y       The Y coordinate for the vectors' starting point.
;   U       The U component of the vector (east/west).
;   V       The V component of the vector (north/south).
;
;
; KEYWORDS:
;   Many of the standard plotting keywords are implemented in this
routine.
;   The keywords that are currently implemented are:
;   Symsize
;   DT_Range
;   XRange
;   YRange
;   Title
;   XTitle
;   YTitle

```

```

PRO STICKPLOT, X, Y, U, V, $
  Symsize=mySymsize, $
  DT_Range=myDT_Range, $
  XRange=myXRange, $
  YRange=myYRange, $
  Title=myTitle, $
  XTitle=myXTitle, $
  YTitle=myYTitle

```

```

; Some keywords should just modify system variables.
; Old values are restored at the end of this routine...

```

```

IF KEYWORD_SET(myTitle) THEN BEGIN
  oldTitle = !P.Title
  !P.Title = myTitle
ENDIF

```

```

IF KEYWORD_SET(myXTitle) THEN BEGIN
  oldXTitle = !X.Title
  !X.Title = myXTitle
ENDIF

```

```

IF KEYWORD_SET(myYTitle) THEN BEGIN

```

```

    oldYTitle = !Y.Title
    !Y.Title = myYTitle
ENDIF

Nm1 = N_ELEMENTS(X)-1

IF NOT KEYWORD_SET(mySymsize) THEN mySymsize = 1.0

x_info = SIZE(X)
x_dims = x_info(0)
x_type = x_info( n_elements(x_info) - 2)

IF ( x_type EQ 8 ) THEN BEGIN

    ; The independent variable is a date/time structure...

    IF (n_params() NE 3) THEN BEGIN
        PRINT, 'stickplot error: need exactly 3 parameters when plotting
versus date/time.'
        RETALL
    ENDIF

    IF NOT KEYWORD_SET(myDT_Range) THEN BEGIN
        myDT_Range = [X(0).julian, X(Nm1).julian]
    ENDIF

    ; Okay, this is going to be a vector diagram
    ; with a date/time horizontal axis...

    ; Need the magnitude for future scaling...

    Mag = sqrt(Y*Y + U*U)
    Xhat = Y / Mag
    Yhat = U / Mag

    ; Create a little unit vector...
    USERSYM, [0,Xhat(0)], [0,Yhat(0)]

    PLOT, X(0), [0], $
        XStyle=1, YRange=[-1,1], $
        YTickLen=1.E-8, YTicks=2, YTickname = REPLICATE(' ',30), $
        DT_Range=myDT_Range, $
        Psym = 8, Symsize=Mag(0)*mySymsize

    FOR i = 1,Nm1 DO BEGIN
        USERSYM, [0,Xhat(i)], [0,Yhat(i)]
        OPLOT, X(i), [0], $
            Psym = 8, Symsize=Mag(i)*mySymsize
    
```

ENDFOR

ENDIF ELSE BEGIN

; The independent variable is an array of real numbers (doubles, or integers)

IF (N_PARAMS() EQ 2) THEN BEGIN

IF NOT KEYWORD_SET(myXRange) THEN BEGIN

myXRange = [0, Nm1]

ENDIF

; This case handles

; STICKPLOT, X, Y

; where 'X', and 'Y' are the components of the vector...

Mag = sqrt(X*X + Y*Y)

Xhat = X / Mag

Yhat = Y / Mag

; Create a little unit vector...

USERSYM, [0,Xhat(0)], [0,Yhat(0)]

PLOT, [0], [0], \$

XRange=myXRange, YRange=[-1,+1], \$

YTickLen=1.E-8, YTicks=2, YTickname = REPLICATE(' ',30), \$

Psym = 8, Symsize=Mag(0)*mySymsize

FOR i = 1,Nm1 DO BEGIN

USERSYM, [0,Xhat(i)], [0,Yhat(i)]

OPLOT, [i], [0], \$

Psym = 8, Symsize=Mag(i)*mySymsize

ENDFOR

ENDIF ELSE IF (N_PARAMS() EQ 3) THEN BEGIN

; This case handles

; STICKPLOT, X, U, V

; where 'U', and 'V' are the components of the vector,

; and 'X' is the independent variable on the horizontal axis.

Mag = sqrt(Y*Y+U*U)

Xhat = Y / Mag

Yhat = U / Mag

IF NOT KEYWORD_SET(myXRange) THEN BEGIN

myXRange = [min(X), max(X)]

```

ENDIF

IF NOT KEYWORD_SET(myYRange) THEN BEGIN
    myYRange = [-1, +1]
ENDIF

; Create a little unit vector...
USERSYM, [0,Xhat(0)], [0,Yhat(0)]

PLOT, [X(0)], [0], $
    XRange=myXRange, YRange=myYRange, $
    YTickLen=1.E-8, YTicks=2, YTickname = REPLICATE(' ',30), $
    Psym = 8, Symsize=Mag(0)*mySymsize

FOR i = 1,Nm1 DO BEGIN
    USERSYM, [0,Xhat(i)], [0,Yhat(i)]
    OPLOT, [X(i)], [0], $
        Psym = 8, Symsize=Mag(i)*mySymsize
    ENDFOR
ENDIF ELSE IF (N_PARAMS() EQ 4) THEN BEGIN
    Mag = sqrt(U*U + V*V)

    IF NOT KEYWORD_SET(myXRange) THEN BEGIN
        myXRange = [min(X), max(X)]
    ENDIF

    IF NOT KEYWORD_SET(myYRange) THEN BEGIN
        myYRange = [min(Y), max(Y)]
    ENDIF

    ; Create a little unit vector...

    ang = atan(v(0), u(0))
    Xtmp = [ 0, 0.8, 0.8, 1.0, 0.8, 0.8, 0 ]
    Ytmp = [ 0, 0, 0.05, 0, -0.05, 0, 0 ]
    Xhat = cos(ang) * Xtmp + sin(ang)*Ytmp
    Yhat = cos(ang) * Ytmp - sin(ang)*Xtmp

    USERSYM, Xhat, Yhat

    PLOT, [X(0)], [Y(0)], $
        XRange=myXRange, YRange=myYRange, $
        Psym = 8, Symsize=Mag(0)*mySymsize

    FOR i = 1,Nm1 DO BEGIN
        ang = atan(v(i), u(i))
        Xhat = cos(ang) * Xtmp + sin(ang)*Ytmp
        Yhat = cos(ang) * Ytmp - sin(ang)*Xtmp

```

```

        USERSYM, Xhat, Yhat
        OPLOT, [X(i)], [Y(i)], $
            Psym = 8, Symsize=Mag(i)*mySymsize
    ENDFOR
ENDIF ELSE BEGIN
    PRINT, 'stickplot error: incorrect number of parameters.'
    RETALL
ENDELSE

ENDELSE

IF KEYWORD_SET(myTitle) THEN BEGIN
    !P.Title = oldTitle
ENDIF

IF KEYWORD_SET(myXTitle) THEN BEGIN
    !X.Title = oldXTitle
ENDIF

IF KEYWORD_SET(myYTitle) THEN BEGIN
    !Y.Title = oldYTitle
ENDIF

RETURN
END

**** cut here ****
===

```

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