
Subject: Re: Gradient of two dimensional field
Posted by [Andy Loughe](#) on Mon, 03 Mar 1997 08:00:00 GMT
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Wilpert_Martin wrote:

>
> Hi everybody,
>
> we want to determine the electrical field from a given potential,
> i.e. we have to calculate the gradient of a two dimensional array.
>
> Has anybody a idl-pvwave procedure to do this task?
>
> Thank you in advance
> Martin Wilpert

The gradient of a 2-D field is a vector field, this function computes the i,j vector components of the gradient, and returns the *magnitude* of that vector field. It performs one-sided differences at the lateral boundaries, which is an assumption that your field does not have a cyclical boundary condition. Let me know if it works for you!

```
; Compute the magnitude of the vector gradient.  
;  
; Andrew F. Loughe (afl@cdc.noaa.gov)  
;
```

```
function grad, data, x, y
```

```
sz = size(data) & im = sz(1) & jm = sz(2)
```

```
if ( N_params() eq 0 ) then message, ' grad_data = grad(data, x, y)'  
if ( sz(0) ne 2 ) then message, 'Input data must be 2-D'  
if ( N_elements(x) eq 0 ) then x = indgen(im) + 1  
if ( N_elements(y) eq 0 ) then y = jm - indgen(jm)
```

```
; Begin here
```

```
x2 = x # replicate(1, jm)  
y2 = replicate(1,jm) # y
```

```
; i-component  
if (x(1) gt x(0)) then dx = shift(x2, -1, 0) - shift(x2, 1, 0)  
if (x(1) lt x(0)) then dx = shift(x2, 1, 0) - shift(x2, -1, 0)  
grad_x = ( shift(data, -1, 0) - shift(data, 1, 0) ) / dx
```

```

; j-component
if (y(1) lt y(0)) then dy = shift(y2, 0, 1) - shift(y2, 0, -1)
if (y(1) gt y(0)) then dy = shift(y2, 0, -1) - shift(y2, 0, 1)
grad_y = ( shift(data, 0, 1) - shift(data, 0, -1) ) / dy

; But for non-cyclic boundary values we still have a problem...
; Take care of the outter rows and columns
grad_y(*,jm-1) = ( data(*,jm-1) - data(*,jm-2) ) / $
                ( y2(*,jm-1) - y2(*,jm-2) )
grad_y(*,0)   = ( data(*,1) - data(*,0) ) / ( y2(*,1) - y2(*,0) )

grad_x(im-1,*) = ( data(im-1,*) - data(im-2,*) ) / $
                ( x2(im-1,*) - x2(im-2,*) )
grad_x(0,*)   = ( data(1,*) - data(0,*) ) / ( x2(1,*) - x2(0,*) )

grad = sqrt(grad_x^2 + grad_y^2)

return, grad

end

```

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 "I do not feel obliged to believe that the same God who has endowed us
 with
 sense, reason, and intellect has intended us to forego their use."
 -Galileo
