Subject: Re: Gradient of two dimensional field
Posted by bowman on Wed, 19 Feb 1997 08:00:00 GMT
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In article <brian.jackel.106.19DE53E0@uwo.ca>, brian.jackel@uwo.ca (Brian Jackel) wrote:

>>> 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?
>
>> I would think that the shift function (used twice)
>> could be used to do this.
>
> Or even just
>
> dx= a(1:*,*) - a
> dy= a(*,1:*) - a
>
> or
>
> dx= a(1:n-1,*) - a(0:n-2,*)
> dy= a(*,1:m-1) - a(*,0:m-2)
>
> if "a" has dimensions of (n,m). When doing it the first way IDL takes
> care of the different array sizes, with no perceptible performance hit.
> The second way is perhaps a bit easier to read. Is this what you (the
> original poster) were after?

You may want to use centered differences, i.e.

dzdx = (SHIFT(z,-1, 0) - SHIFT(z, 1, 0))/(2.0*dx)
dzdy = (SHIFT(z, 0,-1) - SHIFT(z, 0, 1))/(2.0*dy)

(I trust the compiler is smart enough to convert the division to multiplication.)

Don't forget to fix the edges, i.e., use uncentered differences for the normal component or whatever is appropriate for your problem.

Ken

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Kenneth P. Bowman, Assoc. Prof. 409-862-4060
Department of Meteorology 409-862-4132 fax
Texas A&M University bowman@csrp.tamu.edu

College Station, TX 77843-3150
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