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Assignment #5
11/31/09

A note: I found a bug from the previous assignment (present in 3&4) that resulted in my velocity field having negative values. Since this does not affect the result of previous assignments (contour plots of magnitude don't take into account sign), I won't be changing their results however I have fixed it for assignments 5&6.

#Solving the Hyperbolic Equation

The function hyperbolic(args) was added to main with the purpose of propagating an initialized field (fld) with a timestep (delt) by the number of steps (steps). Using the vector field from assignment 3 (vx,vy) I propagate value of the field at each point. A masking scheme was created to handle the boundary conditions, if a boundary condition is met at any point the corresponding velocity component is simply left out (masked) of the calculation. To save on memory the entire field at every timestep is not stored, rather after a timestep the current field is written to a file (act_fld.dat) for use later. A total of 8000 timesteps were used to propagate the field almost completely out of the boundary range.

#Results

The field at 4 timesteps is plotted in the figure field_stages.pdf, created using my matlab script plot_hyperbolic.m.
An avi file was generated and is called hyperbolate.avi, created using my matlab script movie_hyperbolic.m. The matlab function 'shading interp' was used to eliminate ugly grid lines, I understand this is not the "true" image of the data but it makes it easier to see the growth of the field.

#Details on Movie Making
The movie_hyperbolic.m script generates 400 jpg files in the ./pics/ directory, it takes several minutes to run. From there the mencoder tool was used to compile the frames at 24fps and compress the resulting avi using the mpeg4 codec. The exact command used was:

```
mencoder "mf://pics/shade_stage*.jpg" -mf fps=24 -o hyperbolate.avi -ovc lavc -lavcopts vcodec=mpeg4
```