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% Numerical approximation to Poisson's equation over the square [a,b]x[a,b] with
% Dirichlet boundary conditions.  Uses a uniform mesh with (n+2)x(n+2) total
% points (i.e, n interior grid points).
% Input:
%     ffun : the RHS of poisson equation (i.e. the Laplacian of u).
%     gfun : the boundary function representing the Dirichlet B.C.
%      a,b : the interval defining the square
%        m : m+2 is the number of points in either direction of the mesh.
% Ouput:
%        u : the numerical solution of Poisson equation at the mesh points.
%      x,y : the uniform mesh.

function [u,x,y] = fd2poissonsor(ffun,gfun,a,b,m,w)

h = (b-a)/(m+1); %mesh spacing

tol = 10^(-8);   %relative residual

maxiter = 1000;  %maximum value of k

[x,y] = meshgrid(a:h:b); %Uniform mesh, including boundary points.

idx = 2:m+1;
idy = 2:m+1;
dx = 1:m+2;
dy = 1:m+2;

u = zeros(m+2,m+2);

% Compute boundary terms, south, north, east, west
u(1,:)    = feval(gfun,x(1,:),y(1,:));        % Include corners
u(m+2, :) = feval(gfun,x(m+2,:),y(m+2,:)); % Include corners
u(idy,m+2)    = feval(gfun,x(idy,m+2),y(idy,m+2));        % No corners
u(idy,1)      = feval(gfun,x(idy,1),y(idy,1));              % No corners

% Evaluate the RHS of Poisson's equation at the interior points.
f = feval(ffun,x(dy,dx),y(dy,dx));

for k = 0:maxiter
    %Iterate
    for j = 2:(m+1)
        for i = 2:(m+1)
            u(i,j) = (1-w)*u(i,j)+(w/4)*(u(i-1,j)+u(i+1,j)+u(i,j-1)+u(i,j+1)-(h^2)*f(i,j));
        end
    end

    %Compute the residual
    residual = zeros(m+2,m+2);

    for j = 2:(m+1)
        for i = 2:(m+1)
            residual(i,j) = -4*u(i,j)+(u(i-1,j)+u(i+1,j)+u(i,j-1)+u(i,j+1)-(h^2)*f(i,j));
        end
    end

    %Determine if convergence has been reached
        if norm(residual(:),2)<tol*norm(f(:),2)
                break
    end
end

end
```

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Not enough input arguments.

Error in fd2poissonsor (line 15)
h = (b-a)/(m+1); %mesh spacing
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