

MATLAB code	Petc code
	<pre>#include "petsc.h" #include "petscmat.h" #include "petscksp.h"  int main(int argc, char **argv) {     PetscInt n,i,Istart,Iend,*index;     Mat A;     Vec f,x;     KSP ksp;     PC pc;     PetscScalar *val,h;     PetscInitialize(&amp;argc, &amp;argv, PETSC_NULL, PETSC_NULL);</pre>
N=500;	n=500;
h=1/(n-1);	h=(float)1/(n-1);
A=spalloc(n,n,3);	<pre>MatCreate(PETSC_COMM_WORLD, &amp;A); MatSetSizes(A,PETSC_DECIDE,PETSC_DECIDE,n,n); MatSetFromOptions(A); MatMPIAIJSetPreallocation(A,3,PETSC_NULL,0,PETSC_NULL); MatGetOwnershipRange(A, &amp;Istart, &amp;Iend);</pre>
<pre>for i=2:n-1     A(i,[i-1,i,i+1])=(1/h^2)*[-1,2,-1]; end A(1,[1,2])=(1/h^2)*[2,-1]; A(n,[n-1,n])=(1/h^2)*[-1,2];</pre>	<pre>PetscMalloc(3*sizeof(PetscInt), &amp;index); PetscMalloc(3*sizeof(PetscScalar), &amp;val); val[0]=-1/h/h;val[1]=2/h/h;val[2]=-1/h/h; for (i=Istart;i&lt;Iend;i++) {     index[0]=i-1;     index[1]=i;     if (i+1==n)     index[2]=-1;     else     index[2]=i+1;      MatSetValues(A,1,&amp;i,3,index,val,INSERT_VALUES);</pre>

	<pre> } MatAssemblyBegin(A,MAT_FINAL_ASSEMBLY); MatAssemblyEnd(A,MAT_FINAL_ASSEMBLY); </pre>
<pre>f=sin(0:h:1);</pre>	<pre> VecCreate(PETSC_COMM_WORLD, &amp;f); VecSetSizes(f,PETSC_DECIDE,n); VecSetFromOptions(f); for (i=Istart;i&lt;Iend;i++)     VecSetValue(f,i,sin(i*h),INSERT_VALUES); VecAssemblyBegin(f); VecAssemblyEnd(f); </pre>
<pre>x=pcg(A,f',1e-5,1e3);</pre>	<pre> VecDuplicate(f,&amp;x); KSPCreate(PETSC_COMM_WORLD,&amp;ksp); KSPSetOperators(ksp,A,A,DIFFERENT_NONZERO_PATTERN); PCCreate(PETSC_COMM_WORLD,&amp;pc); KSPSetFromOptions(ksp); PCSetFromOptions(pc); KSPSolve(ksp,f,x); </pre>
<pre>plot(x)</pre>	<pre> VecView(x,PETSC_VIEWER_DRAW_WORLD); </pre>
	<pre> PetscFinalize(); return 0; } </pre>

