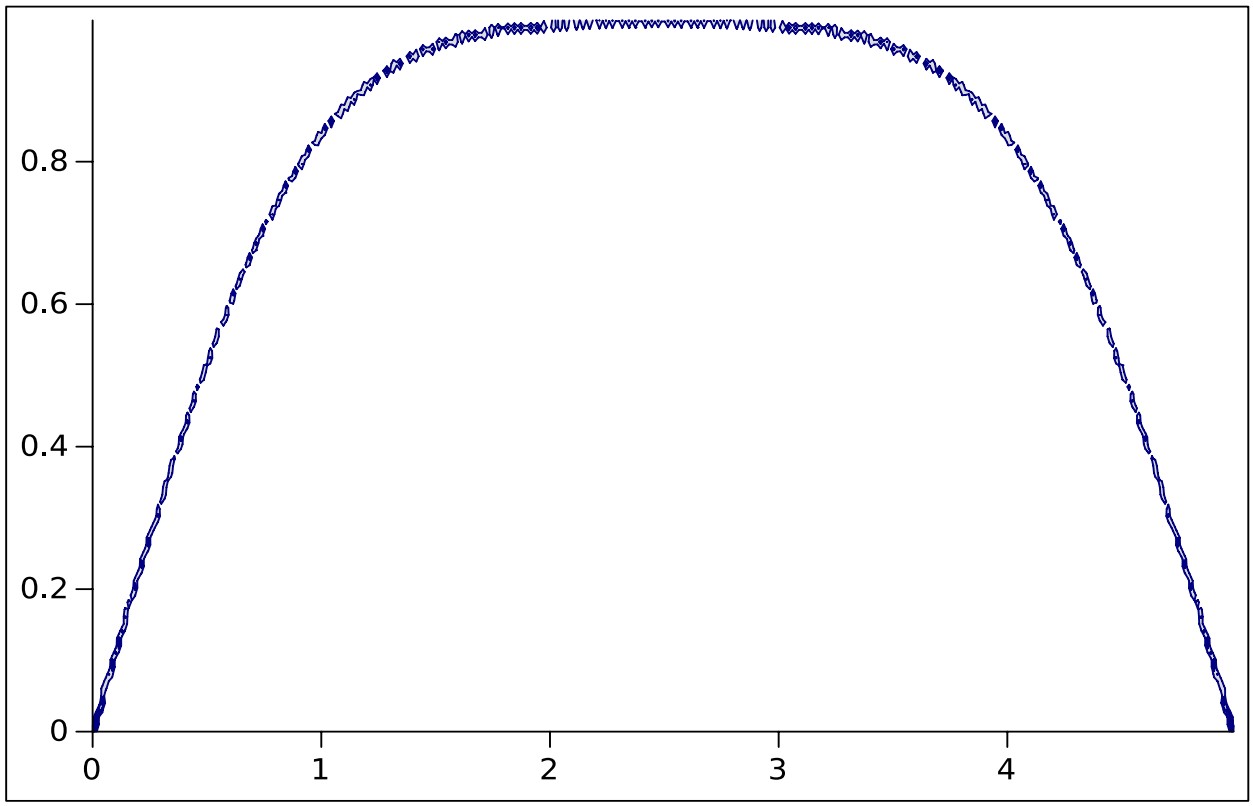
NUMERICAL Calculation of potential on a charged disk




```
#include <fstream>
#include <cmath>
#include <stdlib.h>
using namespace std;

int main() {
    const float Lx = 5.0, Ly = 5.0; // Ø§Ø¨Ø¹Ø§Ø¯ Ù□Ø¶Ø§ÛŒ Ø´Ø¨ÛŒÙ‡â€ŒØ³Ø§Ø²ÛŒ
    const float h = 0.01; // Ø§Ù†Ø¯Ø§Ø²Ù‡ Ú¯Ø§Ù… Ø´Ø¨Ú©Ù‡
    const int Nx = Lx / h;
    const int Ny = Ly / h;
    const int dx = Nx / 2, dy = Ny / 2; // Ù…Ø±Ú©Ø² Ø¯ÛŒØ³Ú©

    float phi1[Nx][Ny], phi2[Nx][Ny];
```

```
// Ù…Ù,Ø¯Ø§Ø±Ø¯Ù‡ÛŒ Ø§Ù^Ù„ÛŒÙ‡ Ù¾Øªâ§Ù†Ø³ÛŒÙ„

for (int x = 0; x < Nx; ++x) {

   for (int y = 0; y < Ny; ++ay) {

      phi1[x][y] = 1.0; // Ù…Ù,Ø¯Ø§Ø±Ø¯Ù‡ÛŒ Ù‡Ù…Ù‡ Ù†Ù,Ø§Ø· Ø¨Ù‡ 1

      phi2[x][y] = 1.0; // Ù…Ù,Ø¯Ø§Ø±Ø¯Ù‡ÛŒ Ù‡Ù…Ù‡ Ù†Ù,Ø§Ø· Ø¨Ù‡ 1

   }

}a


// Ø§Ø¹Ù…Ø§Ù„ Ø´Ø±Ø§ÛŒØ· Ù…Ø±Ø²ÛŒ Ø¯ÛŒØ±ÛŒÚ©Ù„Ù‡ (Ù¾Øªâ§Ù†Ø³ÛŒÙ„ Ø«Ø§Ø¨Øª Ø±Ùˆ Ù…Ø±Ø²Ù‡Ø§)

for (int x = 0; x < Nx; ++x) {

   phi1[x][0] = 0.0;

   phi2[x][0] = 0.0;

   phi1[x][Ny-1] = 0.0;

   phi2[x][Ny-1] = 0.0;

}

for (int y = 0; y < Ny; ++y) {

   phi1[0][y] = 0.0;

   phi2[0][y] = 0.0;

   phi1[Nx-1][y] = 0.0;

   phi2[Nx-1][y] = 0.0;

}


// Ø±Ù^Ø´ Ø¢Ø±Ø§Ù…â€ŒØ¨Ø®Ø´ÛŒ Ø¨Ø±Ø§Ûœ Ù…ØØ§Ø³Ø¨Ù‡ Ù¾Øªâ§Ù†Ø³ÛŒÙ„

for (int iter = 0; iter < 1000000; ++iter) {

   for (int x = 1; x < Nx-1; ++x) {

      for (int y = 1; y < Ny-1; ++y) {

         phi2[x][y] = 0.25 * (phi1[x+1][y] + phi1[x-1][y] + phi1[x][y+1] + phi1[x][y-1]);
```

```
            }
        }
        for (int x = 1; x < Nx-1; ++x) {
            for (int y = 1; y < Ny-1; ++y) {
                phi1[x][y] = phi2[x][y];
            }
        }
    }

    // Ø°Ø®ÛŒØ±Ù‡ Ù†ØªØ§ÛŒØ¬ Ø¯Ø± Ù□Ø§ÛŒÙ„
    ofstream out("pp15.dat");
    for (int x = 0; x < Nx; ++x) {
        for (int y = 0; y < Ny; ++y) {
            out << x * h << "\t" << y * h << "\t" << phi1[x][y] << endl;
        }
    }
    out.close();
}
```