1125-VC-1281 **Yinlin Dong*** (yinlin@uta.edu), University of Texas at Arlington, Department of Mathematics, Arlington, TX 76019, and **Chaoqun Liu**. *Solving Poisson's Equations Using Buffered Fourier Spectral Method.* Preliminary report.

We propose a numerical method based on fast Fourier transform (FFT) algorithm to solve elliptic partial differential equations. To illustrate our buffered Fourier spectral method (BFSM), we begin with solving ordinary differential equations for one variable. By implementation of buffer zone, we will make the source function and its derivative periodic on the boundaries, so that FFT can be applied on the extended domain. Once we obtain the numerical results, we will delete the buffer zone and recover the original solution. Compared with the regular FFT, our method can improve the error order from 10^{-4} to 10^{-9} when the grid size $N = 128$ with little extra computation cost. We then apply BFSM to solve Poisson's equations with non-periodic boundary conditions. As shown in examples, our method has gained high order accuracy and less computation time compared with the second order finite difference method. The method will be further used for simulation of transitional and turbulent flows. (Received September 15, 2016)