1114-35-168 **Treena Basu*** (basu@oxy.edu). *A second order fast method for the one-dimensional space-fractional diffusion equations.* Preliminary report.

Fractional diffusion equations model phenomena exhibiting anomalous diffusion that can not be modeled accurately by the second order diffusion equations. Because of the non-local property of fractional differential operators, the numerical methods have full coefficient matrices which require storage of $O(N^2)$ and computational cost of $O(N^3)$, where $N$ is the number of grid points.

Together we develop a fast finite difference method for the one-dimensional space fractional diffusion equation, which only requires storage of $O(N)$ and computational cost of $O(NlogN)$, while retaining the same accuracy and approximation property as the regular finite difference method. Numerical experiments are presented to show the utility of the method. (Received August 25, 2015)