1057-35-58 **Alexander P Sviridov*** (aps14@pitt.edu), 301 Thackeray Hall, Pittsburgh, PA 15260.
p-harmonic functions with drift on graphs.

Consider a connected finite graph E with set of vertices $\mathfrak{X}$. Choose a nonempty subset $Y \subset \mathfrak{X}$, not equal to the whole $\mathfrak{X}$, and call it the boundary $Y = \partial\mathfrak{X}$. We are given a real valued function $F : Y \to \mathbb{R}$. Our objective is to find function u on $\mathfrak{X}$, such that $u = F$ on Y and u satisfies the following equation for all $x \in \mathfrak{X} \setminus Y$

$$u(x) = \alpha \max_{y \in S(x)} u(y) + \beta \min_{y \in S(x)} u(y) + \gamma \left(\frac{\sum_{y \in S(x)} u(y)}{\#(S(x))} \right),$$

where $\alpha, \beta,$ and γ are some predetermined non-negative constants such that $\alpha + \beta + \gamma = 1$, for $x \in \mathfrak{X}$, $S(x)$ is the set of vertices connected to x by an edge, and $\#(S(x))$ denotes the cardinality of $S(x)$. We prove uniqueness and existence of the solution of the above Dirichlet problem and study qualitative studies of the properties of the solutions. (Received December 28, 2009)