1135-35-323 **Daniel G Marvin*** (danielmarvin09@gmail.com), 8614 Manchester Rd #7, Silver Spring, MD 20901. *An Analysis of Traffic Flow with Laplacian Constraints in Bounded Space.* Preliminary report.

With the population continuing to increase in the metropolitan area of the District of Columbia (D.C.), traffic reduction will remain a top priority for regional policy makers in the foreseeable future. One solution has resulted in an incorporation of traffic circles to minimize stand-still time while also minimizing negative traffic incidents, such as collisions and fatalities.

A mathematical approach which offers an interesting perspective on the system is modeling the traffic flow as an incompressible and irrotational fluid as defined by two of Laplace's equations often used in Fluid Dynamics. We pose several questions regarding optimizing efficiency versus safety and study how variations in the boundary conditions, given by variations in geometry and physical constraints, affect the resulting traffic flow.

Traffic circles and traffic flow were studied as a conservative system modeled as an incompressible fluid within a finite-dimensional, bounded, vector space. Through analysis of the space, the notion that symmetry is the key factor in optimization with respect to both efficiency and safety was mathematically yielded given defined constraints. (Received August 23, 2017)