Volume 1, Issue 1 November 2013

Interdisciplinary collaboration between engineering, mathematics and science

SEMS Research Highlights

This newsletter presents the research conducted within the School of Engineering, Mathematics and Science (SEMS) at Robert Morris University (RMU). It covers various relevant topics including: interdisciplinary efforts, successful research grants, student research, posters and papers, journal publications, presentations at national and international conferences, contribution to professional societies, STEM educational research, industrial consulting collaborations and applied research.

A Computer Model for Optimizing the Location of Natural Gas Fueling

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Journal of Sustainable Energy Technologies and Assessment (2013)

High levels of fine particulate matter and ozone in many major cities are causing increased respiratory problems, increased asthma attacks and premature death. Natural gas vehicles have been reported to emit up to 95% less particulate matter than diesel powered vehicles and up to 90% less ozone-producing carbon monoxide and reactive hydrocarbons. The adoption of natural gas vehicles, therefore, could play a large role in improving air quality in many cities. Because of the many costs associated with the introduction of a new fueling infrastructure, optimum distribution of fueling stations will play a major role in widespread use of natural gas vehicles, especially in the early stages of market penetration.

A model was developed that can be used to optimize fueling station placement-based on traffic volume using a Monte Carlo algorithm. In particular, the Monte Carlo method allows for the placement of the fueling stations based upon their proximity to high volume traffic flow and the placement of all the fueling stations are optimized simultaneously. Traffic volume data from Pittsburgh, PA was used in the model simulations. Figure 1 (a) shows a map of the Pittsburgh region where the density of traffic flow is displayed in red. The darker the red coloration, the higher the traffic density.

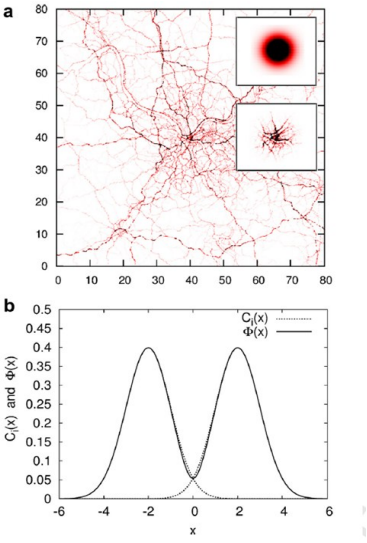

Figure 1 (b) shows how the model accounts for overlap between fueling stations.

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