Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Harnessing Wind Power in Moving Reference Frames with Application to Vehicles OLEG GOUSHCHA, Manhattan College, ROBERT FELICISSIMO, The City College of New York , AMIR DANESH-YAZDI, Penn State Univ., Erie, YIANNIS ANDREOPOULOS, The City College of New York — The extraction of wind power from unique configurations embedded in moving vehicles by using micro-turbine devices has been investigated. In such moving environments, the specific power of the air motion is much greater and less intermittent than in stationary wind turbines anchored to the ground in open atmospheric conditions. In a translational frame of reference, the rate of work done by the drag force acting on the wind harnessing device due the relative motion of air should be taken into account in the overall performance evaluation through an energy balance. A device with a venting tube has been tested that connects a high-pressure stagnating flow region in the front of the vehicle with a low-pressure region at its rear. Our analysis identified two key areas to focus on for potentially significant rewards: (1) Vehicles with high energy conversion efficiency which require a high mass flow rate through the venting duct, and (2) low efficiency vehicles with wakes, which will be globally affected by the introduction of the venting duct device in a manner that reduces their drag so that there is a net gain in power generation.

Oleg Goushcha
Manhattan College

Date submitted: 27 Jul 2017 Electronic form version 1.4