

Abstract Submitted  
for the GEC16 Meeting of  
The American Physical Society

**The effect of humidity on ionic wind velocity in ambient air**<sup>1</sup> SHE CHEN, J.C.P.Y. NOBELEN, S. NIJDAM, Eindhoven University of Technology — Due to the evolution of portable electronics and LED lighting system, advances in air cooling technologies must also keep pace. Active cooling by ionic wind, which is usually generated by corona discharge, can greatly reduce the noise and lifetime issues compared to the mechanical fans. The wind is induced when a gas discharge is formed, and neutral molecules gain their energy by the momentum transfer of ion-neutral collisions. However, there is few discussion about the effect of gas composition such as humidity on the wind generation and the physical mechanism is not clear. In the experiment, a positive 5-20 kV DC voltage is applied to the needle-cylinder electrodes with separation of 20 mm. The ionic wind velocity is measured by hot wire anemometry. As the relative humidity (RH) in the ambient air increases, the velocity is found to be severely inhibited. The current is also measured between the cylinder electrode and earth. The results show that the DC component of corona current decreases when RH increases. Since both the discharge current and the ion mobility are reduced when RH increases, their combined effects determine the ionic wind velocity.

<sup>1</sup>This work is supported by STW project 13651.

She Chen  
Eindhoven University of Technology

Date submitted: 09 Jun 2016

Electronic form version 1.4