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**Simulation of an air ionizer.** KHATTARA TOUFIK, HEBHOUB HAMZA, JEAN-MAXIME ORLACH[1], LAUX CHRISTOPHE O, Laboratoire EM2C, CNRS, Ecole CentraleSuplec, Universit Paris-Saclay, Gif-sur-Yvette, France
— Air ionizers are a class of air purifier relying on the generation of ions by application of an electric field between two metallic electrodes of unequal radius of curvature. The ions are accelerated by the electric field and thanks to ion-neutral collisions momentum is transferred from ions to neutral molecules, thereby creating a so-called "ionic wind". Ionic wind can be used for air purification purpose: dust and particles in suspension in the ambient air collect electrons when crossing the discharge area. These negatively charged particles then deposit onto grounded surfaces, where they can be cleaned up in the usual way. We present here a model for ionic wind generation. The model couples the Navier-Stokes equations for the flow momentum with the drift-diffusion equations for the electron, negative ions and positive ions densities, and with the Poisson equation for the electric potential. Source terms involve ionization, attachment, detachment, and recombination. The model is validated against a laboratory experiment using two cylindrical electrodes of different radii, where the gas velocity profile has been measured accurately. The predicted current-voltage characteristics are also compared with experimental ones.

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