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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The enhancement of droplet collision by electric charges and atmospheric electric fields" *by* Shian Guo and Huiwen Xue

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Comments to the manuscript with ID "acp-2019-1140" General comments: This manuscript studied the effect of electric charges and atmospheric electric fields on collision efficiency and the size distribution of cloud droplets numerically. The author concluded that electric charges and fields could accelerate large-drop formation in natural conditions, particularly for clouds with small droplet size. In my opinion, the manuscript is not acceptable for publication in its present form. Some major corrections should be done to make sure that the results can be more appropriate. Main points: 1) There are some errors in Eq. (3). The second term of the right hands of Eq. (3) should be the loss of droplets of mass m, however, the collection kernel is about droplets of mass mx and mass m-mx. 2) Equation (7) describe the induced flow

field u, however, Eq. (7) dose not satisfy no-slip boundary for two interacting droplets. Specifically, in the superimposed induced flow field according Eq. (7), the fluid velocity on the surface of the droplet is not equal to the velocity of the droplet. The detailed description paper of the theory was published in Journal of the Atmospheric Sciences in 2005 (https://journals.ametsoc.org/doi/full/10.1175/JAS3397.1). 3) Fig. 4 gives the initial spectrum mass distribution in 2D grids of bin. For charged clouds, the initial charge is distributed symmetrically, as shown in Fig. 4b: 14% with charge +1r2, 14% with charge -1r2, 22% with charge +0.5r2, 22% with charge -0.5r2, and 28% with no charge. What is the principle determining the abovementioned charge ratio? Is there any observation data to prove the charge ratio?

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