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**Charge distribution in thunderstorm clouds** <boldface, 12pt>

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**Abstract**. Charge distribution in thunderstorm clouds has been studied by the simultaneous electric field measurements ------------------------ . This paper describes ------------------------ . Charge distribution in thunderstorm clouds has been studied by the simultaneous electric field measurements ------------------------ . This paper describes ------------------------ . Charge distribution in thunderstorm clouds has been studied by the simultaneous electric field measurements ------------------------ . This paper describes ------------------------ . <hereafter single space, 11pt>

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**Keywords:** keyword 1, keyword 2, keyword 3, keyword 4

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**1. Introduction**

 One of the most fundamental problems in thunderstorm electricity is to determine charge quantities and their positions in the storm clouds. Tanaka (1985) have shown that ------------------------------------------------------------------------------------------------------------------------------------------------------------.

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Figure 1. Model of charge distribution in thunderstorm clouds.

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**2. Measurements and data analysis**

**2.1. Measurements**

 The electric fields have been measured at eight stations in Tokyo for active thunderstorms which appeared during the five summer seasons 2015-2018 -----------------------------------------------------------------------------------------. The measurements equipment consists of -----------------------------------------------------------------------------------------.

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**3. Results and discussion**

 Obtained observation data are shown in Tab. 1. ----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------.

Table 1. Observation data.

|  |  |
| --- | --- |
| Data 1 | 123 |
| Data 2 | 456 |
| Data 3 | 789 |
| -------------------------------------- | -------------------------------------- |
| -------------------------------------- | -------------------------------------- |
| -------------------------------------- | -------------------------------------- |
| -------------------------------------- | -------------------------------------- |
| -------------------------------------- | -------------------------------------- |
| -------------------------------------- | -------------------------------------- |
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 Figure 2 represents the estimated charge quantities and their positions in clouds. The quantities of charge $C$ is estimated by Suzuki et al. (2010) as

 $C=\sqrt{1-{a^{2}}/{b^{2}}}$ …………………………………………………………. (1)

Here, $a$ and $b$ are aaa and bbb values, respectively (Tanaka 1985; Yamada and Yamakawa 2016). The bbb value is given by

 $b=\frac{1}{2π}\sqrt{\frac{Y}{ε\_{0}}}$ …………………………………………………………. (2)

Substituting the permittivity of free space $ε\_{0}$ into the Eq. (2), $b$ can be approximated as --------.

 ---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------.



Figure 2. Estimated charge quantities and their positions in clouds.

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**4. Conclusion**

 It is concluded that the charge distribution in thunderclouds is -------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------.

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