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ONLINE ISSN : 1348-6365

PRINT ISSN : 1882-2754

## JOURNAL OF THE JAPAN STATISTICAL SOCIETY

Vol. 33 (2003) , No. 1 pp.39-64

[\[PDF \(240K\)\]](#) [\[References\]](#)**Electrostatic Views of Stein-type Estimation of Location Vectors**Toshio Ohnishi<sup>1)</sup> and Takemi Yanagimoto<sup>1)</sup>*1) The Institute of Statistical Mathematics*

**Abstract:** Stein-type estimation of location vectors is discussed with the aid of the theory of electrostatics. We consider a class of estimating functions and assess the superiority of an estimating equation by its mean squared norm. The Coulomb potential function leads to a Pythagorean relationship with respect to this norm. By making full use of the Pythagorean relationship, we improve upon the likelihood estimating function. A further improvement is shown to be feasible under a certain condition which is described. We pursue possible strong relationships between the superiority over the likelihood estimating function and physical quantities appearing in the theory of electrostatics.

**Key words:** Coulomb potential function, electrostatics, estimating function, Green's formula, James-Stein estimator, James-Stein positive-part estimator, Pythagorean relationship

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To cite this article:

Toshio Ohnishi and Takemi Yanagimoto; "Electrostatic Views of Stein-type Estimation of Location Vectors", *JOURNAL OF THE JAPAN STATISTICAL SOCIETY*, Vol. **33**, pp.39-64 (2003) .



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