Experimental conditions to observe critical points in fine particle (dusty) plasmas: An inverse problem and solution[1] HIROO TOTSUJI, Okayama University — Statistical properties of fine particle (dusty) plasmas are characterized by dimensionless parameters and critical points are expected to be observed at some specified combinations. When the experimental conditions of density and temperatures are known, the dimensionless parameters are readily computed. However, it is not straightforward to determine experimental conditions to realize a given combination of dimensionless parameters including charging condition of fine particles. We show some possibilities of critical points [1] and solve this inverse problem as much as possible analytically, giving typical example by finally resorting to numerical methods [2]. The dependency of experimental conditions on various dimensionless characteristic parameters is obtained. We also analyze the dependency on species of neutral atoms. The results may be helpful to observe various phenomena related to the strong coupling between fine particles including possible existence of the critical point.

[1] H. Totsuji, Physics of Plasmas, Vol.15, 072111(2008); Journal of Physics A: Mathematical and Theoretical, Vol.42, 214022(2009).
[2] Earlier results have been given in, H. Totsuji, Plasma and Fusion Research, Vol.3, 046(2008).

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