

LEEI-10 Electrostatic Field Mapping Apparatus



In engineering applications, it is often needed to know the electric field distribution of an electrode system in order to study the motion behavior of the electrons or charged particles in an electric field. For example, the electric field distribution of the electrodes in an oscilloscope tube should be known for the study of electron beam focusing and deflection in the oscilloscope tubes.

In general, mathematical analysis or experimental simulation can be used to derive the distribution of an electric field. The former method is normally used for simple cases while the latter method should be used for complicated electrode systems. Simulation method uses an easy-to-implement or easy-to-measure physical process to substitute an inconvenient-to-implement or not-easy-to-measure physical process. It requires that the two states or two sets of physical quantities in two physical processes have a one-to-one corresponding relationship, similar mathematical expressions, and similar boundary conditions. For a stable physical field, once its differential equations and boundary conditions are determined, its solution is unique. Since a steady current field has the same mathematical expressions and boundary conditions as an electrostatic field, it is used to simulate the electrostatic field.

Using this apparatus, students can:

1. Learn to study electrostatic fields using simulation method.
2. Deepen the understanding on concepts of strength and potential of electric fields.
3. Map the equipotential lines of a coaxial cable and a pair of parallel electrodes.

- Intuitive and clear configuration
- Convenient operation
- Stable and reliable measurements

Specifications

Description	Specifications
Power supply	0 ~ 15 VDC, continuously adjustable
Digital voltmeter	range -19.99 V to 19.99 V, resolution 0.01 V
Parallel wire electrodes	Electrode diameter 15 mm Distance between electrodes 95 mm
Coaxial electrodes	Diameter of central electrode 15 mm Width of ring electrode 10 mm Inner diameter of ring electrode 150 mm

Parts

Item	Qty
Main electric unit	1
Conductive glass & carbon paper support	1
Probe and needle support	1
Conductive glass plate	2
Connection wire	4
Paper clamp	4
Coordinate paper	100 sheets
Carbon paper	100 sheets
Optional conductive glass plate	2
Instruction manual	1

Examples of electrode patterns and corresponding electrostatic field simulations

