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# Mathematical Model of Ferromagnetic Objects Identification

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## Abstract

Analysis of inverse magnetometry problems mathematical models with determination of their advantages and disadvantages is provided. The need to develop a mathematical model for ferromagnetic objects identification, taking into account the integral properties of magnetic field, has been reasonably proven. Mathematical model offered in a linear formulation is interpreting object as a point dipole at distances from the measurement points far exceeding the object's geometric dimensions. Application of measurements grids expanding method is presented from previous researches. Mathematical model adequacy is confirmed by a numerical experiment. © 2024 IEEE.

## Abstract

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## Author keywords

closed circuit; error; ferromagnetic object; hysteresis; integral properties; inverse magnetometry problem; linear problem; magnetic field; magnetic induction vector; magnetic momentum; mathematical model; measurement grid; numerical experiment; point dipole

## Indexed keywords

### Engineering controlled terms

Automation; Differential equations; Errors; Identification (control systems); Integral equations; Inverse problems; Magnetometers; Magnetometry; Numerical methods; Numerical models

### Engineering uncontrolled terms

Closed circuit; Ferromagnetic object; Induction vectors; Integral property; Inverse magnetometry problem; Linear problems; Magnetic induction vector; Magnetic momentum; Magnetic-field; Measurement grids; Numerical experiments; Point dipole; Property

### Engineering main heading

Ferromagnetism; Magnetic fields; Magnetite

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