



Electric Field Analysis

By Sivaji Chakravorti

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Electric Field Analysis is both a student-friendly textbook and a valuable tool for engineers and physicists engaged in the design work of high-voltage insulation systems. The text begins by introducing the physical and mathematical fundamentals of electric fields, presenting problems from power and dielectric engineering to show how the theories are put into practice. The book then describes various techniques for electric field analysis and their significance in the validation of numerically computed results, as well as:

- Discusses finite difference, finite element, charge simulation, and surface charge simulation methods for the numerical computation of electric fields
- Provides case studies for electric field distribution in a cable termination, around a post insulator, in a condenser bushing, and around a gas-insulated substation (GIS) spacer
- Explores numerical field calculation for electric field optimization, demonstrating contour correction and examining the application of artificial neural networks
- Explains how high-voltage field optimization studies are carried out to meet the desired engineering needs

Electric Field Analysis is accompanied by an easy-to-use yet comprehensive software for electric field computation. The software, along with a wealth of supporting content, is available for download with qualifying course adoption.

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Electric Field Analysis By Sivaji Chakravorti Bibliography

- Sales Rank: #3190599 in eBooks
- Published on: 2015-03-16
- Released on: 2015-03-16
- Format: Kindle eBook

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Editorial Review

Review

"... very useful to teachers and students in classes on applications of the theory, numerical analyses, and practice of using the electric field for practical electric power applications that benefit mankind, such as avoiding electrical breakdown in high-voltage systems. ... The book begins at the senior undergraduate level in developing the fundamentals of electric field physics and applications, ... [and] then continues on to advanced numerical methods valuable to graduate students and practitioners."

?Markus Zahn, Massachusetts Institute of Technology, Cambridge, USA

"... gives clear and precise description of the state of the art in electric field analysis. ... the book comes along with software for the computation of capacitive as well as capacitive-resistive electric fields."

Prof. Dr.-Ing. Josef Kindersberger, Technische Universität München, Institute for High Voltage Engineering and Switchgear Technology

"A unique book for understanding electric fields and its computation with particular emphasis to problems and configurations typically encountered by high voltage engineers while designing and building power apparatus and electric insulation systems. The coverage is comprehensive, up to date, and spans the entire spectrum thus making it an ideal book for both undergraduate and graduate students."

?Professor L. Satish, HV Lab, Dept of Electrical Engineering, Indian Institute of Science, Bangalore

"This is a very intriguing book, because it adds a great deal of practical insight into otherwise cold and lifeless equations and theory. It was a pleasure to review it and enjoy many of the applied examples using the theory presented in the first part of the book."

?IEEE Electrical Insulation Magazine, May/June 2016

About the Author

Sivaji Chakravorti holds bachelor's, master's, and Ph.D degrees from Jadavpur University, Kolkata, India. Dr. Chakravorti has nearly 30 years of teaching experience and is currently a full professor in electrical engineering at Jadavpur University, where he teaches electric field analysis at the undergraduate and postgraduate levels. Previously, he worked in various capacities at the Indian Institute of Science, Bangalore; Technical University of Munich, Germany; Siemens AG, Berlin, Germany; ABB Corporate Research, Ladenburg, Germany; Advanced Research Institute of Virginia Tech, Alexandria, USA; and Technical University Hamburg-Harburg, Germany. Dr. Chakravorti is highly decorated, widely published, and an active member of IEEE.

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