IEEE-Wiley eBooks Library Trial

Access Guide

The IEEE-Wiley eBooks Library Trial includes full-text access to the top eBook titles included in IEEE-Wiley eBooks Library for the duration of 2 weeks. Once your institution is setup with access to the IEEE-Wiley eBooks Library Trial, you will be able to access the eBooks titles included in this trial via IEEE *Xplore*®.

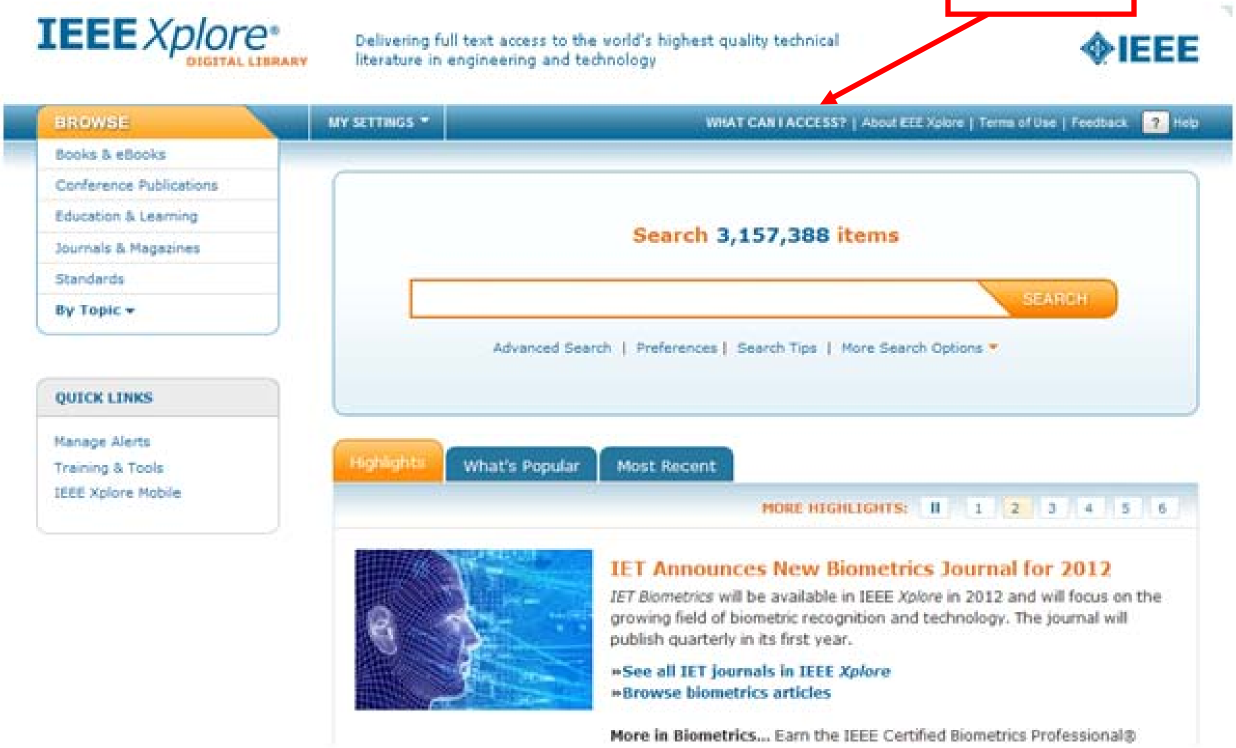
IEEE-Wiley eBooks Library Trial Titles

- Analysis of Electric Machinery and Drive Systems
- Biometrics : Theory, Methods, and Applications
- Electric Power System Basics: For the Nonelectrical Professional
- Electromagnetic Fields
- IP Address Management Principles and Practice
- Intellectual Property Law for Engineers and Scientists
- Introduction to Biomedical Imaging
- Introduction to Magnetic Materials
- Nonvolatile Memory Technologies with Emphasis on Flash: A Comprehensive Guide to Understanding and Using Flash Memory Devices
- Understanding Delta-Sigma Data Converters

The best way to access the titles included in your IEEE-Wiley eBooks Library trial is to go to the IEEE *Xplore* homepage as you normally would and then follow the steps outlined below.

1. **Once on the IEEE *Xplore* homepage you can click on the "What can I access?" link.**

Click on the "What can I access?"



Delivering full text access to the world's highest quality technical literature in engineering and technology

Search 3,157,388 items

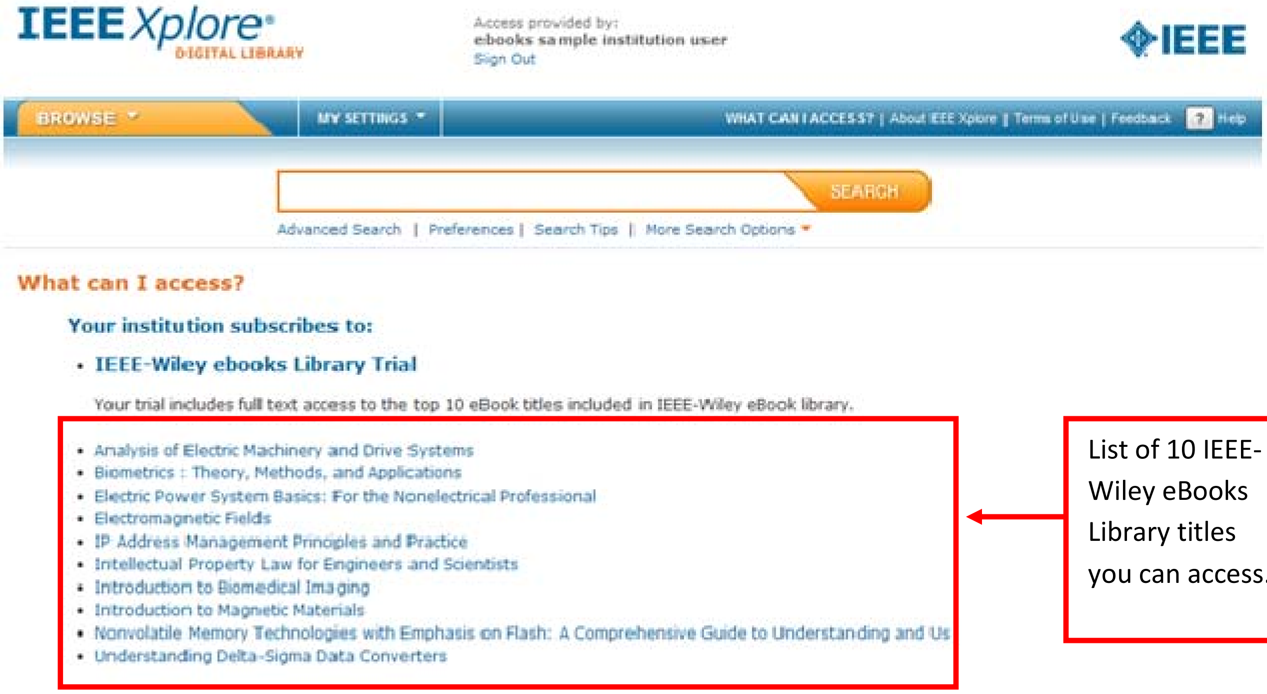
IET Announces New Biometrics Journal for 2012

IET Biometrics will be available in IEEE *Xplore* in 2012 and will focus on the growing field of biometric recognition and technology. The journal will publish quarterly in its first year.

»See all IET journals in IEEE *Xplore*
»Browse biometrics articles

More in Biometrics... Earn the IEEE Certified Biometrics Professional®

2. **You will be redirected to the "What Can I Access?" page. On this page you will find the "IEEE-Wiley eBooks Library Trial" including the list of 10 titles you can access.**



Access provided by:
ebooks sample institution user
Sign Out

What can I access?

Your institution subscribes to:

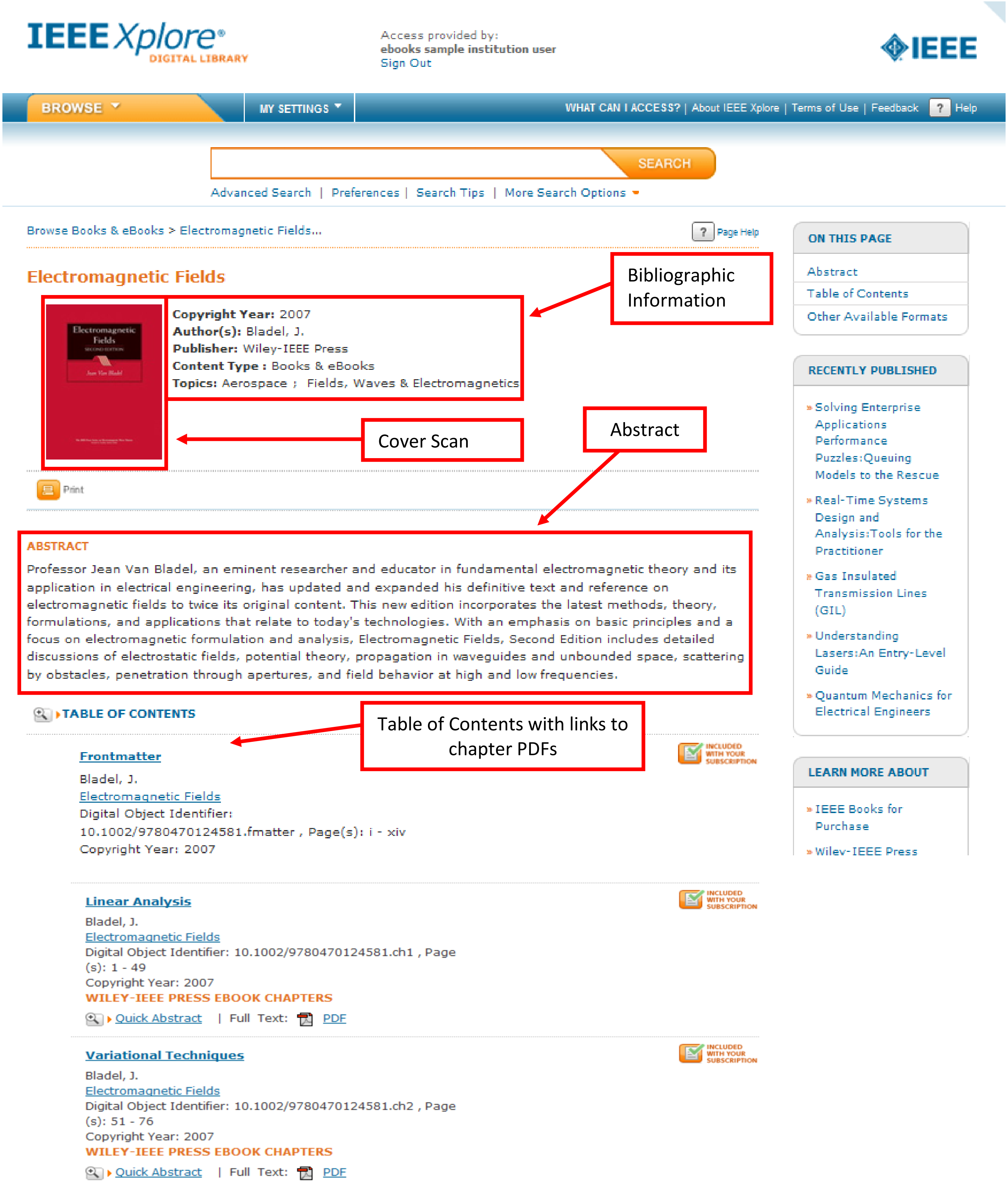
- IEEE-Wiley ebooks Library Trial

Your trial includes full text access to the top 10 eBook titles included in IEEE-Wiley eBook library.

- Analysis of Electric Machinery and Drive Systems
- Biometrics : Theory, Methods, and Applications
- Electric Power System Basics: For the Nonelectrical Professional
- Electromagnetic Fields
- IP Address Management Principles and Practice
- Intellectual Property Law for Engineers and Scientists
- Introduction to Biomedical Imaging
- Introduction to Magnetic Materials
- Nonvolatile Memory Technologies with Emphasis on Flash: A Comprehensive Guide to Understanding and Us
- Understanding Delta-Sigma Data Converters

List of 10 IEEE-Wiley eBooks Library titles you can access.

3. Click on the title you are interested in viewing to be redirected to that title's eBook Homepage. Here you will be able to access the title's abstract, bibliographic information, cover scan, and table of contents with links to the full-text chapter PDFs.



Access provided by:
ebooks sample institution user
Sign Out

Browse Books & eBooks > Electromagnetic Fields...

Electromagnetic Fields

Copyright Year: 2007
Author(s): Bladel, J.
Publisher: Wiley-IEEE Press
Content Type : Books & eBooks
Topics: Aerospace ; Fields, Waves & Electromagnetics

Bibliographic Information

Cover Scan

Abstract

ABSTRACT

Professor Jean Van Bladel, an eminent researcher and educator in fundamental electromagnetic theory and its application in electrical engineering, has updated and expanded his definitive text and reference on electromagnetic fields to twice its original content. This new edition incorporates the latest methods, theory, formulations, and applications that relate to today's technologies. With an emphasis on basic principles and a focus on electromagnetic formulation and analysis, Electromagnetic Fields, Second Edition includes detailed discussions of electrostatic fields, potential theory, propagation in waveguides and unbounded space, scattering by obstacles, penetration through apertures, and field behavior at high and low frequencies.

TABLE OF CONTENTS

Table of Contents with links to chapter PDFs

Frontmatter
Bladel, J.
Electromagnetic Fields
Digital Object Identifier:
10.1002/9780470124581.fmatter , Page(s): i - xiv
Copyright Year: 2007

Linear Analysis
Bladel, J.
Electromagnetic Fields
Digital Object Identifier: 10.1002/9780470124581.ch1 , Page (s): 1 - 49
Copyright Year: 2007
WILEY-IEEE PRESS EBOOK CHAPTERS
Quick Abstract | Full Text: PDF

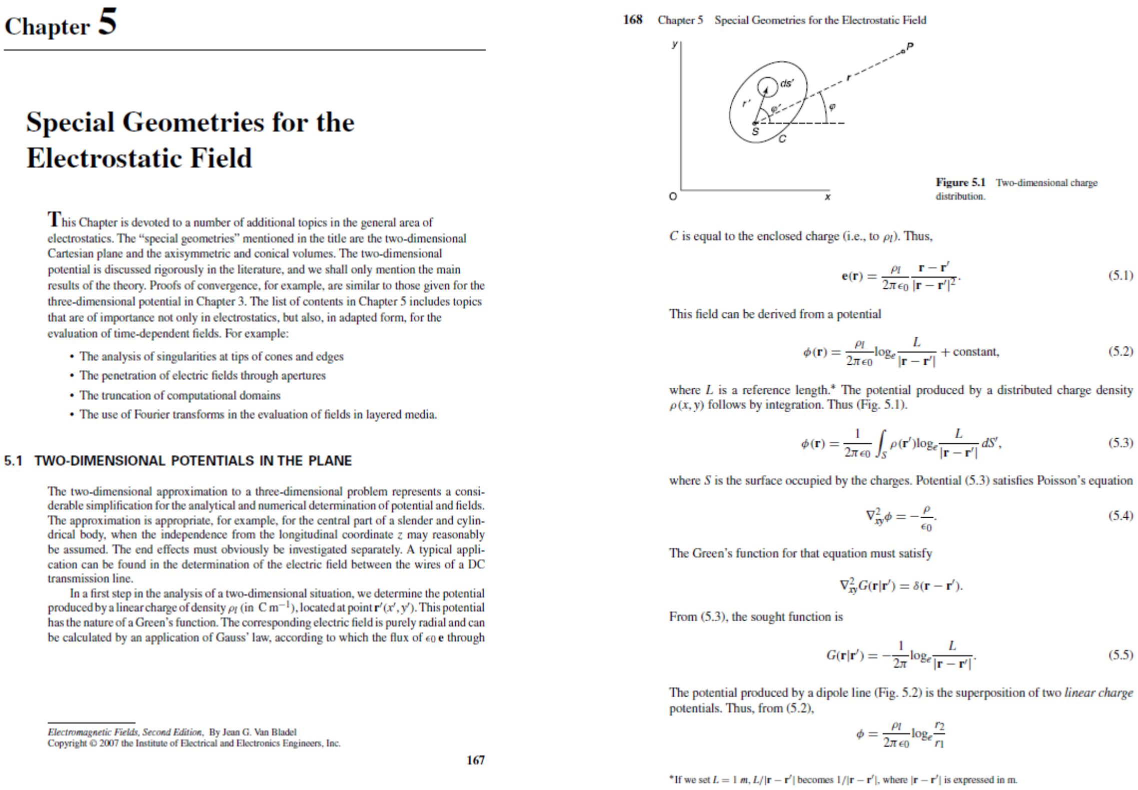
Variational Techniques
Bladel, J.
Electromagnetic Fields
Digital Object Identifier: 10.1002/9780470124581.ch2 , Page (s): 51 - 76
Copyright Year: 2007
WILEY-IEEE PRESS EBOOK CHAPTERS
Quick Abstract | Full Text: PDF

ON THIS PAGE
- Abstract
- Table of Contents
- Other Available Formats

RECENTLY PUBLISHED
- Solving Enterprise Applications Performance Puzzles:Queuing Models to the Rescue
- Real-Time Systems Design and Analysis:Tools for the Practitioner
- Gas Insulated Transmission Lines (GIL)
- Understanding Lasers:An Entry-Level Guide
- Quantum Mechanics for Electrical Engineers

LEARN MORE ABOUT
- IEEE Books for Purchase
- Wiley-IEEE Press

4. **Click on the chapter PDF link you are interested in viewing. This will open the full-text chapter, pages 167-168 shown below from Chapter 5: Special Geometries for the Electrostatic Field of the *Electromagnetic Fields* eBook.**



Chapter 5

Special Geometries for the Electrostatic Field

This Chapter is devoted to a number of additional topics in the general area of electrostatics. The "special geometries" mentioned in the title are the two-dimensional Cartesian plane and the axisymmetric and conical volumes. The two-dimensional potential is discussed rigorously in the literature, and we shall only mention the main results of the theory. Proofs of convergence, for example, are similar to those given for the three-dimensional potential in Chapter 3. The list of contents in Chapter 5 includes topics that are of importance not only in electrostatics, but also, in adapted form, for the evaluation of time-dependent fields. For example:

- The analysis of singularities at tips of cones and edges
- The penetration of electric fields through apertures
- The truncation of computational domains
- The use of Fourier transforms in the evaluation of fields in layered media.

5.1 TWO-DIMENSIONAL POTENTIALS IN THE PLANE

The two-dimensional approximation to a three-dimensional problem represents a considerable simplification for the analytical and numerical determination of potential and fields. The approximation is appropriate, for example, for the central part of a slender and cylindrical body, when the independence from the longitudinal coordinate z may reasonably be assumed. The end effects must obviously be investigated separately. A typical application can be found in the determination of the electric field between the wires of a DC transmission line.

In a first step in the analysis of a two-dimensional situation, we determine the potential produced by a linear charge of density ρ_l (in $\mathrm{C\,m^{-1}}$), located at point $\mathbf{r}'(x', y')$. This potential has the nature of a Green's function. The corresponding electric field is purely radial and can be calculated by an application of Gauss' law, according to which the flux of $\epsilon_0\,\mathbf{e}$ through

Electromagnetic Fields, Second Edition, By Jean G. Van Bladel
Copyright © 2007 the Institute of Electrical and Electronics Engineers, Inc.

167

168 Chapter 5 Special Geometries for the Electrostatic Field

Figure 5.1 Two-dimensional charge distribution.

C is equal to the enclosed charge (i.e., to ρ_l). Thus,

$$\mathbf{e}(\mathbf{r}) = \frac{\rho_l}{2\pi\epsilon_0}\frac{\mathbf{r}-\mathbf{r}'}{|\mathbf{r}-\mathbf{r}'|^2}. \tag{5.1}$$

This field can be derived from a potential

$$\phi(\mathbf{r}) = \frac{\rho_l}{2\pi\epsilon_0}\log_e\frac{L}{|\mathbf{r}-\mathbf{r}'|} + \text{constant}, \tag{5.2}$$

where L is a reference length.* The potential produced by a distributed charge density $\rho(x, y)$ follows by integration. Thus (Fig. 5.1).

$$\phi(\mathbf{r}) = \frac{1}{2\pi\epsilon_0}\int_S \rho(\mathbf{r}')\log_e\frac{L}{|\mathbf{r}-\mathbf{r}'|}\,dS', \tag{5.3}$$

where S is the surface occupied by the charges. Potential (5.3) satisfies Poisson's equation

$$\nabla_{xy}^2\phi = -\frac{\rho}{\epsilon_0}. \tag{5.4}$$

The Green's function for that equation must satisfy

$$\nabla_{xy}^2 G(\mathbf{r}|\mathbf{r}') = \delta(\mathbf{r}-\mathbf{r}').$$

From (5.3), the sought function is

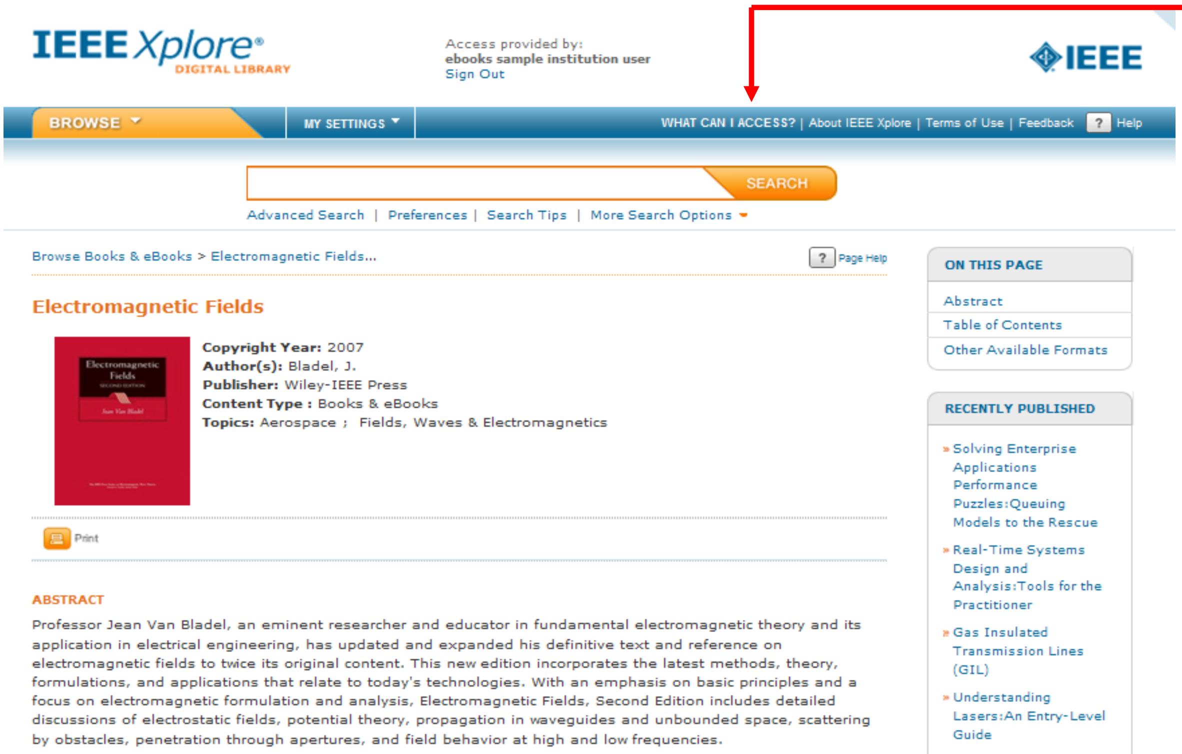
$$G(\mathbf{r}|\mathbf{r}') = -\frac{1}{2\pi}\log_e\frac{L}{|\mathbf{r}-\mathbf{r}'|}. \tag{5.5}$$

The potential produced by a dipole line (Fig. 5.2) is the superposition of two *linear charge* potentials. Thus, from (5.2),

$$\phi = \frac{\rho_l}{2\pi\epsilon_0}\log_e\frac{r_2}{r_1}$$

*If we set $L = 1\ m$, $L/|\mathbf{r}-\mathbf{r}'|$ becomes $1/|\mathbf{r}-\mathbf{r}'|$, where $|\mathbf{r}-\mathbf{r}'|$ is expressed in m.

5. **Once you have finished viewing the current title you can access the remaining titles by clicking on the "What Can I access?" link on the top the page to return to the "What Can I Access?" page where you can select other titles to view.**



Copyright Year: 2007
Author(s): Bladel, J.
Publisher: Wiley-IEEE Press
Content Type : Books & eBooks
Topics: Aerospace ; Fields, Waves & Electromagnetics

ABSTRACT

Professor Jean Van Bladel, an eminent researcher and educator in fundamental electromagnetic theory and its application in electrical engineering, has updated and expanded his definitive text and reference on electromagnetic fields to twice its original content. This new edition incorporates the latest methods, theory, formulations, and applications that relate to today's technologies. With an emphasis on basic principles and a focus on electromagnetic formulation and analysis, Electromagnetic Fields, Second Edition includes detailed discussions of electrostatic fields, potential theory, propagation in waveguides and unbounded space, scattering by obstacles, penetration through apertures, and field behavior at high and low frequencies.

Click on the "What Can I Access?" link to be redirected to the list of eBook titles available during your trial.