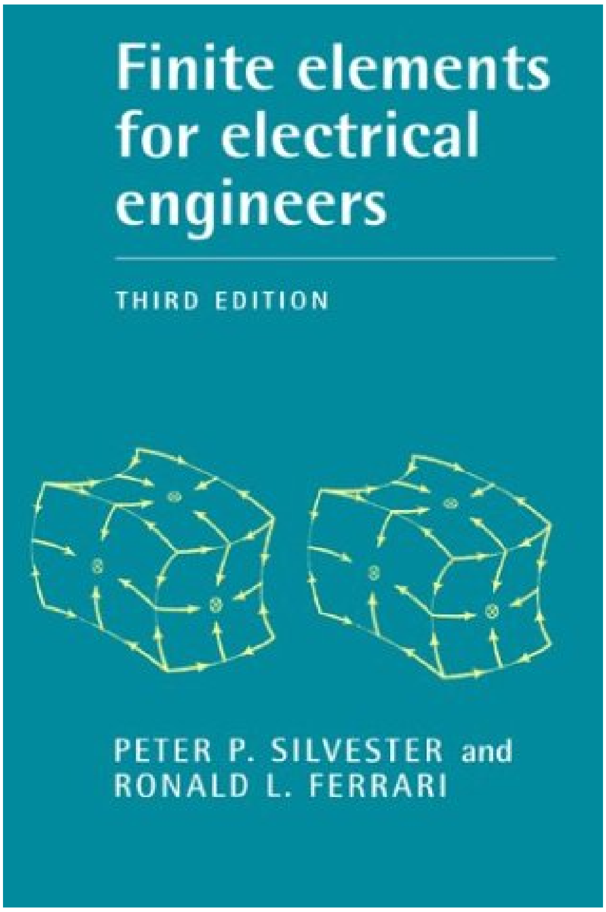
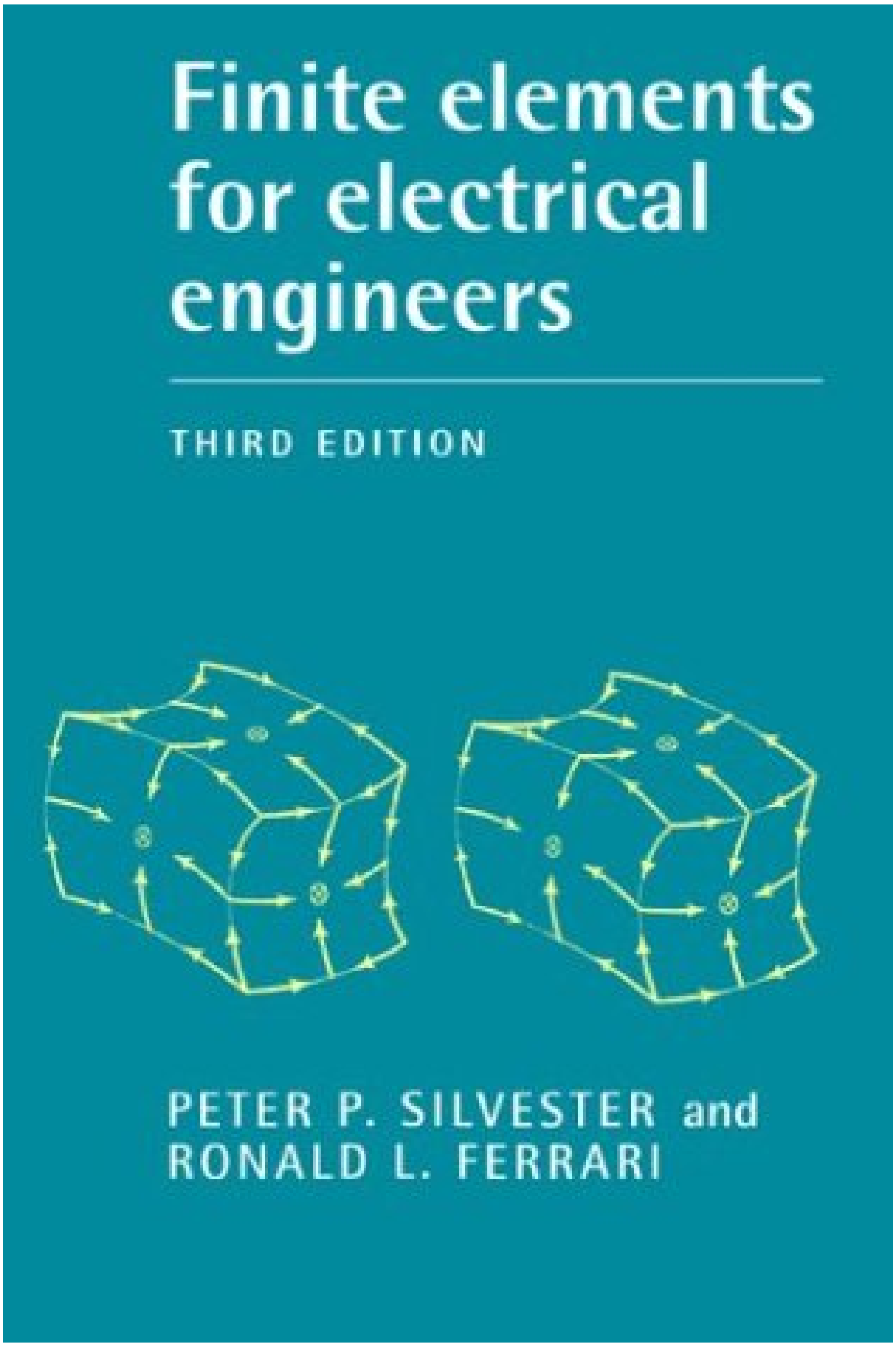
FINITE ELEMENTS FOR ELECTRICAL ENGINEERS BY PETER P. SILVESTER, RONALD L. FERRARI




Finite elements
for electrical
engineers
THIRD EDITION
PETER P. SILVESTER and
RONALD L. FERRARI

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Review
"...a clear, detailed introduction to finite-element analysis...suitable for use as a text in a graduate electrical engineering course. It is also an excellent reference for all electrical engineers who want to understand finite-element analysis well enough to write or modify their own finite-element codes." IEEE Antennas and Propagation Magazine

From the Back Cover
This is the third edition of the principal text on the finite element method, which has become a major solution technique for problems of engineering electromagnetics. It presents the method in a mathematically undemanding style, accessible to undergraduates who may be encountering it for the first time, but the scope is sufficiently broad as to be equally suitable for use by graduate and professional engineers.

About the Author
Peter P. Silvester and David A. Lowther are Professors of Electrical Engineering at McGill University in Montreal, Canada. They are the authors of Computer-Aided Design in Magnetics (Springer-Verlag) as well as of numerous other books and articles in the technical literature.

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Finite Elements For Electrical Engineers By Peter P. Silvester, Ronald L. Ferrari In fact, book is really a home window to the globe. Even many people may not appreciate reading books; the books will certainly consistently provide the precise details concerning fact, fiction, experience, journey, politic, religious beliefs, and also a lot more. We are right here a site that provides compilations of publications greater than guide store. Why? We provide you bunches of numbers of connect to obtain guide Finite Elements For Electrical Engineers By Peter P. Silvester, Ronald L. Ferrari On is as you require this Finite Elements For Electrical Engineers By Peter P. Silvester, Ronald L. Ferrari You could locate this book easily right here.

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This third edition of the principal text on the finite element method for electrical engineers and electronics specialists presents the method in a mathematically undemanding style, accessible to undergraduates who may be encountering it for the first time. Like the earlier editions, it begins by deriving finite elements for the simplest familiar potential fields, and then formulates finite elements for a wide range of applied electromagnetics problems. These include wave propagation, diffusion, and static fields; open-boundary problems and nonlinear materials; axisymmetric, planar and fully three-dimensional geometries; and scalar and vector fields. A wide selection of demonstration programs allows the reader to follow the practical use of the methods. Besides providing all that is needed for the beginning undergraduate student, this textbook is also a valuable reference text for professional engineers and research students.

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Most helpful customer reviews

8 of 9 people found the following review helpful.
Removal of the section on waveguide discontinuity analysis
By DR. PROTAP PRAMANICK
The third edition of FINITE ELEMENTS FOR ELECTRICAL ENGINEERS by Silvester & Ferrari is an excellent book. However, I am quite disappointed with the removal of the section on scattering matrix calculation and waveguide discontinuity analysis which existed (Ch.9, section 4) in the second edition of the book.

3 of 4 people found the following review helpful.
Well structured and easily applicable to other areas
By Paul A. Bonyak
The finite element method is a generalization of the Ritz or variational method which you've probably seen in quantum mechanics. Here the energy integral of a trial function is minimized which gives an estimate of ground state energy. The region of integration is easy here or in any event always the same-over all space. In the finite element method, a variational or minimum principle is used and boundaries of the region over which this particular functional is to be minimized are taken into account in the method and not swept under the rug. Though this book is addressed to electrical engineers, the methods and techniques given are easily portable to other areas of mathematical physics(boundary value problems). I'll give an outline of the first section of chapter 2 which I view as a prototype of the method and also the pattern followed in other sections and examples in the book.
In this example the electric field or rather its potential is to be found between two conductors of a coaxial transmission line of rectangular cross section. Only the 2d cross section need be considered. The Laplace equation for the potential between the two rectangles needs to be solved(approximately). The inner and outer conductors are equipotential surfaces and by symmetry you only need the solution in one quadrant(say +x,+y). Partition this piece into triangles in any way you like as long as they fit together to exactly form this piece(here exact is possible, you may have to settle for close enough on curved boundaries) and for the time being slightly separate these triangles so you can view their vertices as distinct and yet know which vertices need to coincide when put back together. We're going to find values of the potential at the vertices of these triangles. Note that on the conductors the vertex potentials are known or prescribed constants-takes account of boundary. In each triangle an approximation of the potential is sought, they use the simple first-order form u=c+ax+by and since we know the coordinates of the vertices and we assign a variable or constant potential to each we can use Cramer's rule and solve for a, b, and c, results in u=u(1)d(x,y)+u(2)e(x,y)+u(3)f(x,y) where the u's are the potentials at the three vertices and d, e, and f are functions of x,y and vertex position coordinates. Later on in the book the d, e, f are identified as barycentric coordinates and the second form recurs as the interpolative approximation. Going back to our minimum principle the authors show that minimization of electrostatic energy(integral of the square of the gradient of the potential over a region) is equivalent to solution of the Laplace equation in the region in the sense that a solution of the Laplace equation when used as the potential in the integral will give it a minimal value and vice versa. We put our interpolative approximation in for the potential, take gradients(only x and y), etc. and integrate over this particular triangle or element which results in a quadratic form in the three potentials. We add together all the resulting quadratic forms from each triangle(called W-potential function for the region) and write this in form W=U(T) S U where U is the column vector with the potentials as components and U(T) is its transpose-S is the matrix resulting from this factorization. Remembering that our triangles have to be joined and redundant potentials then identified, we'll accomplish this by means of a matrix of 1's and 0's as follows. Suppose for example in the longer or disconnected state column U vector there is a 2nd and an 8th component but when triangles are joined in forming the original region this 2nd vertex and 8th vertex are the same hence the same potential. We'll develop a matrix which gives the longer disconnected state column U vector from the product of the matrix and the shorter connected state column U vector in that order. Here we go, for that 2nd and 8th element, in the 2nd column of the matrix put a 1 in the 2nd and 8th positions and 0's

at the others. The columns have the same length as the longer vector with rows the same length as the shorter vector. Say 1st, 4th, and 7th are to be identified-in first column, 1's at 1st, 4th, and 7th positions, 0's at the rest. Get it-notice the column selected in the matrix is the same as the position of the element in the shorter column. Remembering the transpose of the product is the product of the transposes in reverse order, we substitute the product for the longer U in the W expression and this is to be minimized only with respect to the variable u's not the constant ones on the boundaries. Differentiate W and set equal to 0 for each variable u and apply Cramer's rule to this set of equations-got your u's now.
Sorry about the dissertation but the rest of the book can be viewed as extensions and developments on this pattern. Also I didn't want to give one of those supercilious (and phony) name dropping reviews. I wanted to give you the gist of the finite element method.

1 of 2 people found the following review helpful.
Hard and Heavy but good
By Roger Bagula
I think that the authors don't fill in their matrices or prove some of the results may be my worst fault for this book.
The book is well written and contains most of the formulas and Fortran program you need to do this kind of analysis.
I would have like more complex plane triangles and some more higher dimensional "triangulations".
But the text has been an eye opener for me and I have a lot of study to get the results where I can really understand them.
This text is not an easy one, but the subject even over simplified would still be a very hard one. I think this is an advanced graduate text
and would give most undergrads outside of MIT nightmares.

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