Abstracts

Finite-Element Solution of Unbounded Field Problems

An unbounded region is divided into local picture-frame regions where a partial differential-equation solution is obtained, with the remaining unbounded region represented by an integral equation. (The method permits the use of free-space Green's functions, and thus special problem-dependent Green's functions need not be found.) The integral equation is formulated as a constraint upon the local picture-frame solutions, whence these local solutions are solved directly by a variational method, using finite elements, in a manner such that the problem of the Green's-function singularity is side-stepped. The technique is applicable where sources and media inhomogeneities and anisotropies are local, and can all be placed within one or several picture frames. It is in these cases that the integral-equation approach is at a particular disadvantage, and the use of a partial differential-equation technique is advisable if not necessary. Examples presented include the static and harmonic fields of a parallel-plate capacitor, a microstrip line on a dielectric substratum, and a radiating antenna with dielectric obstacles.

❏ Return to main document.