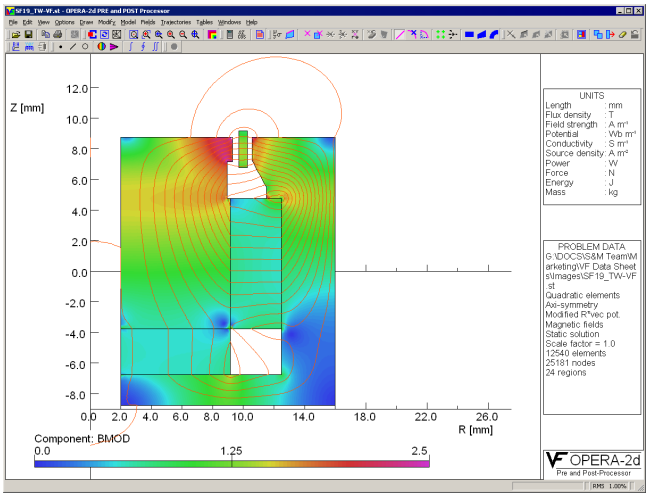
OPERA-2d

DESIGN SOFTWARE FOR ELECTROMAGNETIC DEVICES

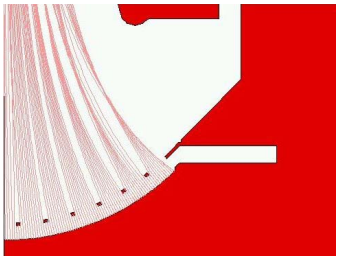
OPERA-2d is a package for the design of electrical equipment combining world leading electromagnetic analysis modules with mechanical stress and thermal analysis. This allows users to initiate the conceptual electromagnetic design and within the same package analyze mechanical stress and thermal effects. OPERA-2d has a Windows style interface using easily understood buttons. This is intuitive and easy to use, which is particularly important for new and infrequent users.



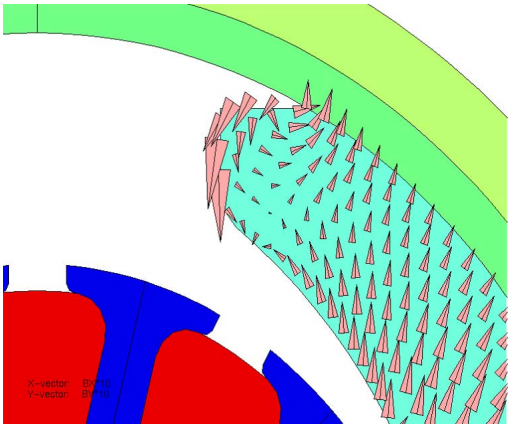
Magnetic B fields and flux lines in an axi-symmetric model of a flat panel loudspeaker exciter. The device is protected by patent applications of New Transducers Ltd.

Typical applications are:-

- Scientific apparatus including MRI
- Magnetization process of permament magnets
- Motors
- Generators
- Actuators
- Sensors
- Magnetic shielding
- NDT equipment
- Magnetic separation
- Magnetic levitation
- X-ray tubes
- Electron lithography
- Induction heating



Particles emitted from surface of spider gridded electron gun



Field in a permanent magnet showing reversal of field direction (3rd quadrant BH curve) during motor start up phase.

OPERA-2d can be used for applications where the third dimension is not a significant factor in the analysis. Examples are axi-symmetric geometries and designs where end effects can be disregarded. If you need any advice on this aspect, the VECTOR FIELDS Application Engineers will be pleased to be of assistance.

OPERA-2d contains the following features:-

- Electrostatic fields
- Magnetostatic fields
- Permanent magnets
- Time varying fields
- Motion induced currents
- Rotational and linear motion
- Coupling to external circuits
- Space charge analysis
- Mechanical stress analysis
- Thermal analysis
- Magnetization process
- Lossy dielectrics
- Menu driven user interface
- Automatic F.E. mesh generation
- Non-linear and anisotropic materials
- Extendable post processing
- Design Environment for parameterization
- CAD interface

VECTOR FIELDS
Software for Electromagnetic Design
www.vectorfields.com

OPERA-2d for Design

Optimal design of electrical equipment requires the use of analysis software dedicated to electromagnetics. By using OPERA-2d, designers have at their disposal the many years experience of the VECTOR FIELDS team, renowned in industry as leaders in electromagnetic computation. This expertise, combined with practical application experience, gives the designer a powerful tool in OPERA-2d which also enables the essential mechanical design parameters to be checked using the stress and thermal analysis modules.

OPERA-2d in Action

The package uses a Windows style interface to allow easy access to features through tool buttons and menus. Frequently used features are accessible with a single mouse click so new users can find their way around the software quickly. The tool buttons are grouped to allow related functionality to be easily identified. On-line help is provided to give useful assistance at each stage of interaction.

The geometry of the design to be analyzed is defined as an assembly of polygons which are automatically divided into elements by the finite element mesh generator. Regions having symmetry properties may be replicated by rotation, reflection or translation. Using these features, together with the copy, move and modify facilities, it is easy to model even the most complex geometry. Magnetic material properties of the geometric regions are specified by inputting the users own data in tabular or graphical form, or from the library of material data contained in the system. The software supports linear, non-linear and anisotropic materials and permanent magnets. All material data can be displayed graphically and can be edited.

Users have the facility to parameterize models allowing dimensions to be modified quickly for analysis, to produce an optimal design.

Analysis

The model created by the OPERA-2d pre processor contains all information required for the analysis modules:-

- Static Fields
- Transient Fields
- Mechanical Stress
- Rotational Motion
- Space Charge
- Lossy Dielectrics
- AC Fields
- Velocity
- Thermal Analysis
- Linear Motion
- Demagnetization

OPERA-2d uses finite element techniques to analyze electromagnetic designs which may be described by the Poisson, Laplace and diffusion equations. The finite element used is the triangle which may be a first order (3-noded) element for fast check of a design or a second order (6-noded) element for higher accuracy.

Post Processing

The OPERA-2d post processor provides extensive facilities for the presentation and display of the results of the analysis. These include:-

- Energy and Power
- Deflection Plots
- Contour Maps
- Color Zoning
- Graphs
- Force and Torque
- Harmonic Analysis
- Line Integrals
- Area Integrals
- Particle Trajectories

Close coupling with the pre processor enables geometric changes or modified material data to be analyzed thus evolving an optimized design quickly and with confidence.

Hardware

The OPERA-2d software runs on PCs and Workstations. It is VECTOR FIELDS policy to always support the latest operating system on each hardware. A list of supported hardware and suggested minimum configurations are available on request.

Customer Support

Applications advice and "hot-line" support is an integral part of the VECTOR FIELDS service. Professional engineers with extensive electrical design experience are available to help users in their application of OPERA-2d. Your main VECTOR FIELDS office or local distributor will be pleased to be of assistance at all times.

Comprehensive user documentation is provided with OPERA-2d enabling new users to quickly apply the software to their application. In addition training courses are held regularly to give "hands-on" training in the use of OPERA-2d.

User group meetings are held annually giving users the opportunity to discuss their applications with VECTOR FIELDS experts and other users in a relaxed atmosphere.

Whatever your application and wherever you are located, you can be sure of VECTOR FIELDS interest and support.

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