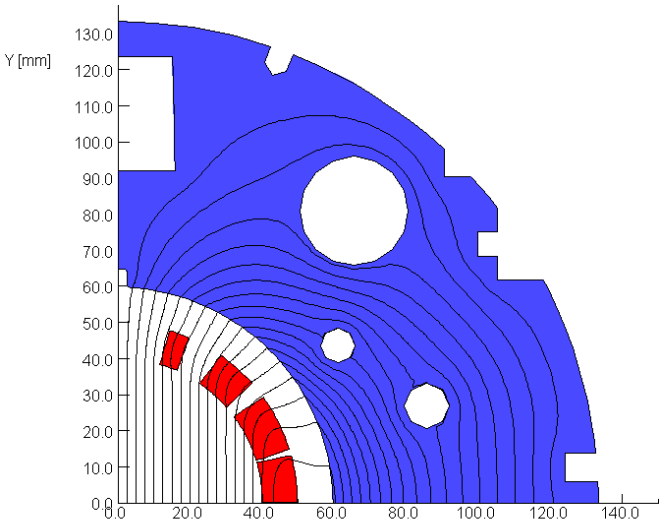
OPERA-2d

DESIGN SOFTWARE FOR ELECTROMAGNETIC DEVICES

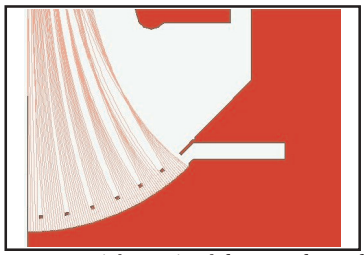
OPERA-2d is a package for the design of electrical equipment combining world leading electromagnetic analysis modules with mechanical stress and thermal analysis. This allows users to initiate the conceptual electromagnetic design and within the same package analyse mechanical stress and thermal effects. OPERA-2d utilises the power of the latest generations of workstation with an advanced Graphical User Interface (GUI) using menus for ease of use.



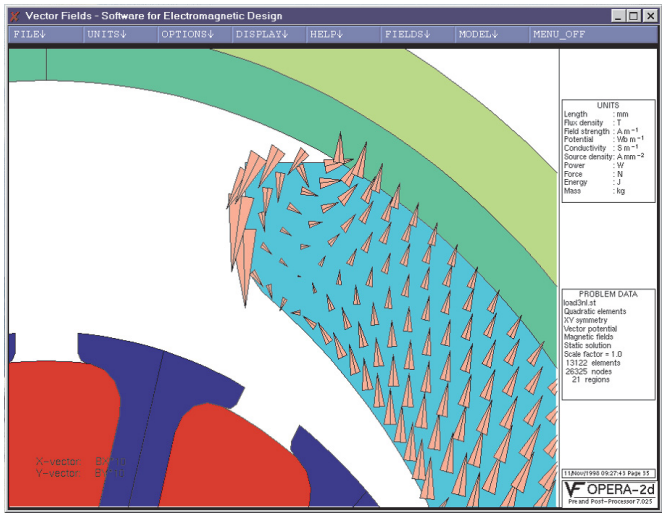
Flux lines in bending magnet

Typical applications are:-

- Scientific Apparatus and other electrical devices
- Magnetisation process of permament magnets
- Motors
- Generators
- Actuators
- Sensors
- Magnetic Shielding
- NDT Equipment
- Magnetic Separation
- Magnetic Levitation
- X-ray tubes
- Electron lithogrophy



Particles emitted from surface of spider gridded electron gun



Field in permanent magnet motor showing reversal of field direction (3rd quadrant of 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
- Time Varying Fields
- Motion Induced Currents
- Rotational and Linear Motion
- Space Charge Analysis
- Mechanical Stress Analysis
- Thermal Analysis
- Magnetisation Process
- Menu Driven User Interface
- Automatic F.E. Mesh Generation
- Non Linear and Anisotropic Materials
- Permanent Magnets
- Extendable Post Processing
- Design Environment

VECTOR FIELDS

Software for Electromagnetic Design

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 Graphical User Interface (GUI) developed by VECTOR FIELDS specifically for electromagnetic analysis and simulation. The basis of this is a series of on-screen menus from which selections are made by a mouse directing a cursor. The geometry of the design to be analysed can be 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 and modify facilities it is easy to model even the most complex geometry. The menu system and prompts give helpful assistance to new users. The 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 data includes linear, non-linear and anisotropic materials and permanent magnets. All material data can be displayed graphically and can be edited.

Although most new users will use the GUI, there is an option for command driven input using the keyboard for users who prefer this method of working.

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
- AC Fields
- Velocity
- Thermal Analysis
- Linear Motion
- Demagnetisation

OPERA-2d uses finite element techniques to analyse 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:-

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

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

Hardware

All VECTOR FIELDS 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 local 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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