High voltage engineering simulations with QuickField

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High voltage engineering simulations with QuickField.

QuickField Overview.

Vladimir Podnos,
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Tera Analysis Ltd.
High voltage engineering
# QuickField Analysis Options

<table>
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<tr>
<th>Magnetic analysis suite</th>
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<tbody>
<tr>
<td>Magnetic Problems</td>
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<td>Magnetostatics</td>
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<td>AC Magnetics</td>
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<td>Transient Magnetic</td>
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<table>
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<th>Electric analysis suite</th>
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<tr>
<td>Electric Problems</td>
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<td>Electrostatics (2D,3D) and DC Conduction (2D,3D)</td>
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<td>AC Conduction</td>
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<td>Transient Electric field</td>
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<table>
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<th>Thermostructural analysis suite</th>
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<td>Thermal and mechanical problems</td>
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<td>Steady-State Heat transfer (2D,3D)</td>
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<td>Transient Heat transfer</td>
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<td>Stress analysis</td>
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</table>
MultiPhysics

Electromagnetic fields

Temperature Field

Losses

Thermal Stresses

Forces

Magnetic state import

Stresses & Deformations
Open object interface
Free ActiveField based tools

QuickField
A new approach to field modelling

Main >> Downloads >> Free utilities to extend QuickField capability

Free tools

These tools are distributed in source codes on "as is" basis. They may be used for their specific tasks, or as examples and templates of QuickField Programming. They are not necessarily production quality and have minimal, if any, documentation.

Depending on the used technology, tools may be run from within QuickField (like Add-ins included into QuickField distributive), run independently and then interact with QuickField on any Windows platform (vbs files) or even require some third party application to run (Microsoft Office for VBA). This is shown in the Type column of the table below.

<table>
<thead>
<tr>
<th>Tool name</th>
<th>Type</th>
<th>Source Code Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add labels to contour</td>
<td>HTML Application (HTA)</td>
<td>JavaScript</td>
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<tr>
<td>Add blocks or edges to contour by their labels.</td>
<td></td>
<td></td>
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<tr>
<td>AC Magnetic and Heat Transfer Double Coupling</td>
<td>Microsoft Excel 2010</td>
<td>VBA</td>
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<tr>
<td>Iterative solution of two mutually coupled AC Magnetic and Heat Transfer QuickField problems</td>
<td>2010 document</td>
<td></td>
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<tr>
<td>AnimationToPPT</td>
<td>Microsoft PowerPoint 2010</td>
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<td>Picture export from QuickField result window to Power Point presentation</td>
<td>2010 document</td>
<td></td>
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<tr>
<td>Core loss coefficients calculator</td>
<td>Microsoft Excel 2013</td>
<td>VBA</td>
</tr>
<tr>
<td>Core loss coefficients calculator is used to calculate the core loss coefficients on given dataset</td>
<td>2013 document</td>
<td></td>
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</tbody>
</table>
QuickField Difference
High voltage engineering simulations with QuickField.

Live presentations.

Alexander Lyubimtsev
Support Engineer
Tera Analysis Ltd.
Needle to plane

Bushing optimization

Supporting insulator

Bus-bars

Solid-state arrester

High voltage engineering simulation with QuickField
Needle to plane

Problem specification:
- Air permittivity: $\varepsilon = 1$
- High voltage 10 kV

Task:
Find maximal electric field stress vs. needle diameter dependency
Bushings optimization

Problem specification:
- Bushing permittivity: $\varepsilon = 2.4$
- Air permittivity: $\varepsilon = 1$
- High voltage 10 kV

Task:
Reduce electric field stress in insulation
Supporting insulator 3D

**Problem specification:**
- Bushing permittivity: $\varepsilon = 2.4$
- Air permittivity: $\varepsilon = 1$
- High voltage $10\, \text{kV}$

**Task:**
Reduce electric field stress in insulation
Problem specification:
SF6 permittivity: $\varepsilon = 6$
Potential difference 10 kV

Task:
Calculate electric field stress distribution.

https://quickfield.com/advanced/bus-bars_90.htm
Solid state surge arrester

Problem specification:
Rate voltage $U = 35$ kV
ZnO permittivity $\varepsilon = 60$
ZnO conductivity $\sigma = \sigma(E)$

Tasks:
Calculate surge pulse transient current

https://quickfield.com/advanced/telec2.htm