

JumpStart seminar for capacitor engineers

1. Introduction. Solving a problem in QuickField.
 - 1.1. QuickField analysis types.
 - 1.2. Finite Element method basics. Features and limitations of QuickField FEA model.
 - 1.3. QuickField license types.
 - 1.4. QuickField system requirements.
2. QuickField basics.
 - 2.1. QuickField problem solving stages.
 - 2.2. QuickField problem database.
 - 2.3. Problem creation.
 - 2.4. Geometry model creation.
 - 2.5. Physical properties definition.
 - 2.6. Result analysis
3. QuickField analysis types overview with practical examples.
 - 3.1. Electrostatic problems.
 - 3.1.1. Example: plane capacitor.
 - 3.1.2. Example: cylindrical capacitor.
 - Capacitance calculations via energy and charge.
 - Capacitance wizard.
 - Field view adjustment.
 - Changing the capacity by adding the second dielectric layer.
 - External field of the capacitor.
 - 3.1.3. Example: Electrolytic capacitor.
 - Model setup decisions.
 - Dielectric pitting.
 - Charge calculation. Surface area calculation. Specific capacity calculation.
 - Designing the pitting system for the required specific capacitance value.
 - Conversion to a 3D problem for accurate simulation of the pitting shape.
 - 3D field picture and capacitance calculation.
 - 3.2. Electric conduction problems
 - 3.2.1. Calculation of the current density using the known capacitance value (Electrostatic simulation) and pulsed voltage magnitude.
 - 3.2.2. Example: Electrolytic capacitor
 - Model setup decisions
 - Conversion of existent Electrostatic model into DC Conduction model
 - Calculation of the current densities, joule heat, voltage drop in the electrolyte
 - Calculation of the electrolyte electrical resistance
 - 3.3. Thermal and mechanical problems
 - 3.3.1. Thermal model creation. Temperature calculations.
 - 3.3.2. Thermal example: design of the radiator for given temperature and size limits

- 3.3.3. Mechanical example: Internal pressure calculation in the capacitor body from the electrolyte thermal expansion. Stress analysis problem setup, types of the boundary conditions
- 3.3.4. Transient thermal example: calculation of the maximal operation time of the overheating capacitor
- 3.4. Magnetic analysis problems
 - 3.4.1. DC Magnetic example: Magnetic field of the cylindrical capacitor, Expanded and curled plates. Inductance calculation.
 - 3.4.2. AC Magnetics with electric circuit example: Equivalent CLR circuit. Impedance calculation for AC magnetic problem. Calculation of the impedance frequency dependency using LabelMover
 - 3.4.3. Transient magnetic example: LC filter.
- 3.5. Advanced electric problems
 - 3.5.1. Transient electric analysis example: Electric stress dependent electric conductivity and permeability. Dielectric breakdown.
 - 3.5.2. AC Electric Analysis example: dielectric losses.
- 4. QuickField installation and configuration. Installed program file structure and components.
- 5. Additional resources
 - 5.1. QuickField help system and User Manual
 - 5.2. QuickField support website overview.
 - 5.3. Virtual Classroom.