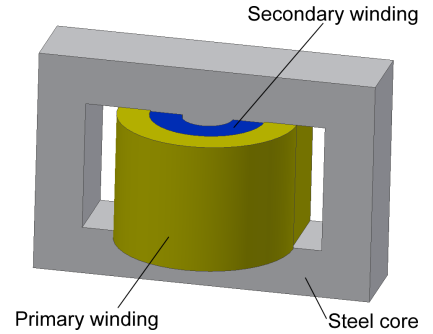
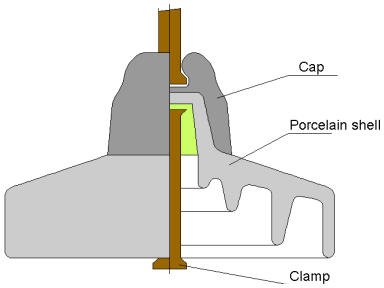
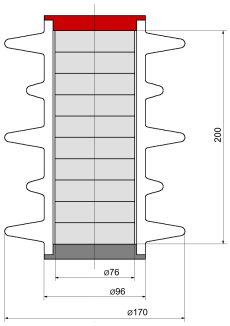
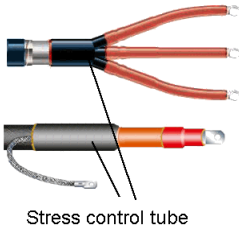
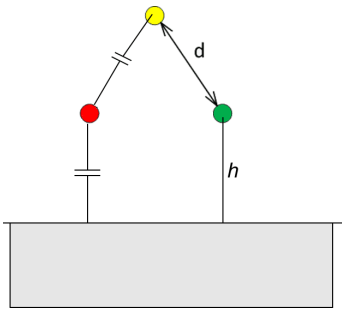
High voltage and capacitance systems simulation with QuickField

QuickField™ is a very efficient Finite Element Analysis package for electromagnetic, thermal, and stress design simulation with coupled multi-field analysis.

QuickField requires no training – you may start using it as soon as it is installed on your computer, without knowing the mathematical algorithms used and details of their implementation.

Here are some examples related to "High voltage and capacitance systems calculation". You can download simulation files from our website:
QuickField.com > *Applications* > *Industrial* > *High-voltage systems*

www.quickfield.com/app_hvs.htm

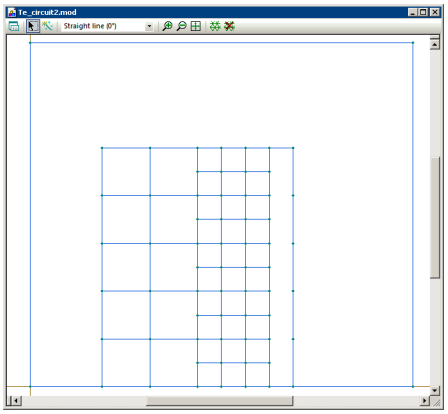
		
Transformer Analysis type: *Transient Magnetic* with *electric circuit*. Results: current and voltage as functions of time.	**Insulator** Analysis type: *Electrostatic*. Results: electric field strength.	**Arrester** Analysis type: *Transient Electric*. Results: electric field strength (as a function of time), current (as a function of time).
		
Stress control tube Analysis type: *Transient Electric*. Results: electric field strength.	**Capacitor** Analysis type: *AC Conduction*. Results: electric field strength, leakage current	**Transmission line** Analysis type: *Electrostatic*. Results: capacitance matrix.

Transformer

www.quickfield.com/advanced/tecircuit2.htm

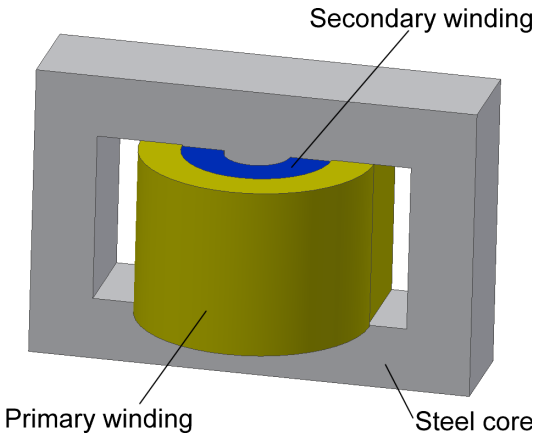
Square voltage impulse is applied to the primary winding of a transformer. Model featuring the QuickField **Transient Magnetic** analysis with electric circuit allows voltages and currents distribution as functions of time visualizing.

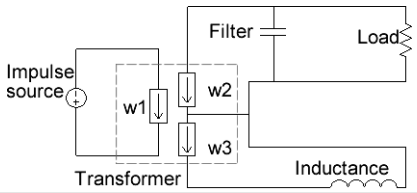
QuickField model

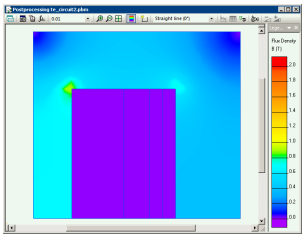


Due to model symmetry we leave the quarter of the transformer only.

Sketch







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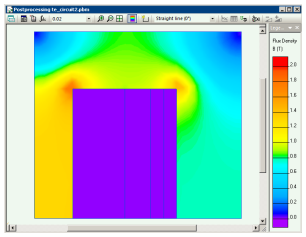

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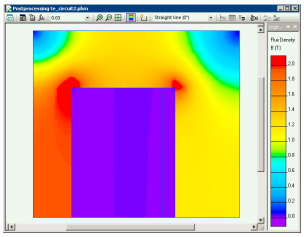

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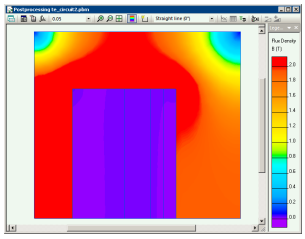

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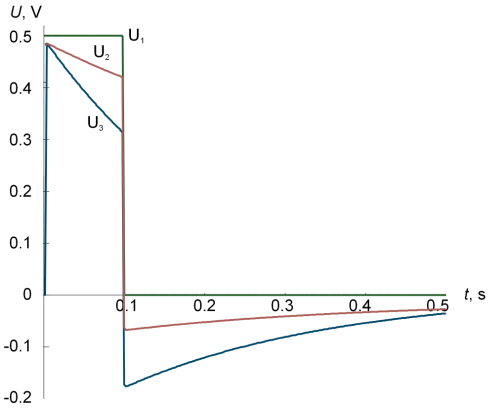
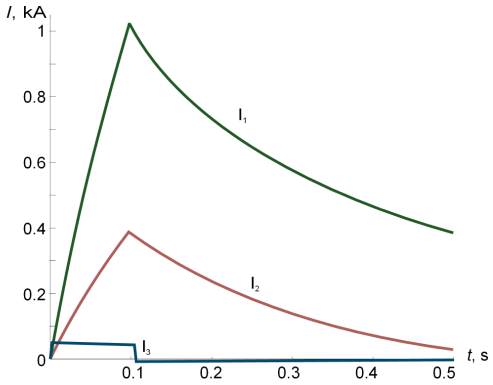
Winding voltages and currents:

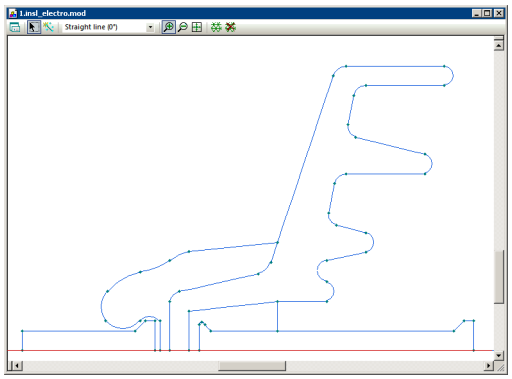
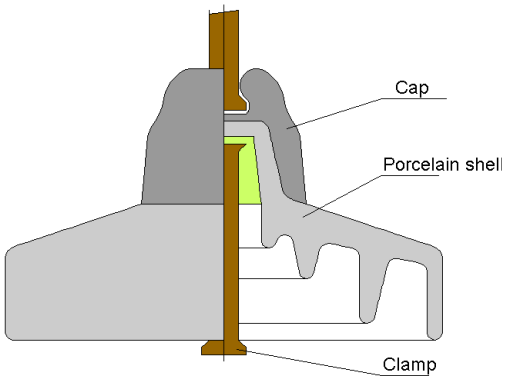


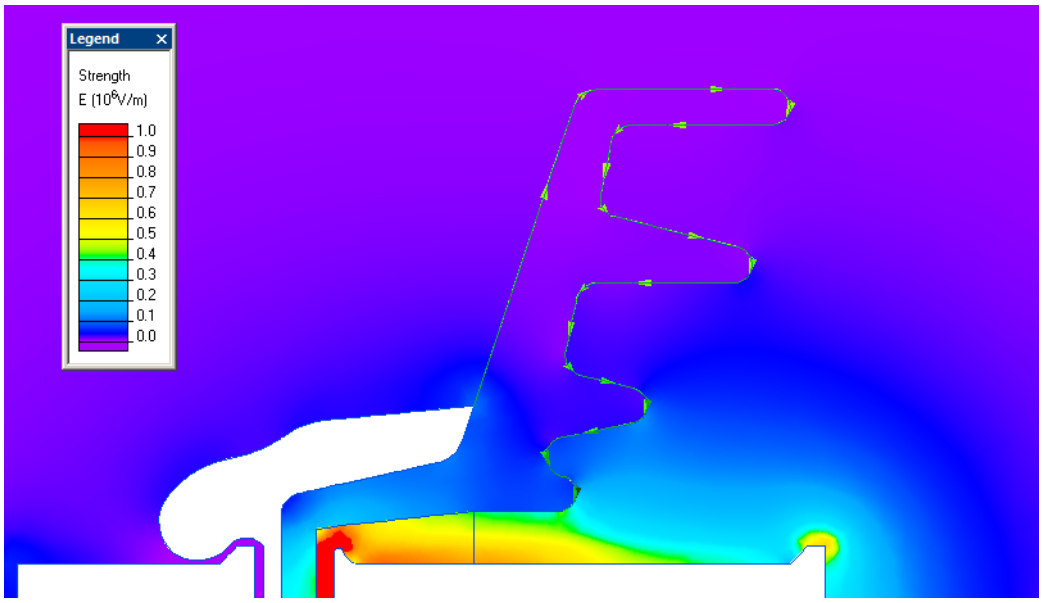


Insulator

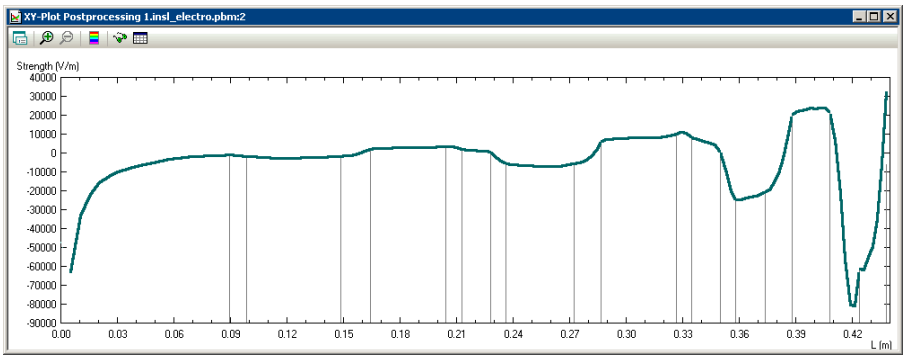
www.quickfield.com/advanced/insulator.htm

Disc insulator is a common element of power transmission lines. Insulator design should assure allowable levels of electric field stress. QuickField **Electrostatic** simulation makes this task easy.

QuickField model	Sketch
	
Axis of rotation is horizontal.	



Electric field stress distribution along the insulator surface.

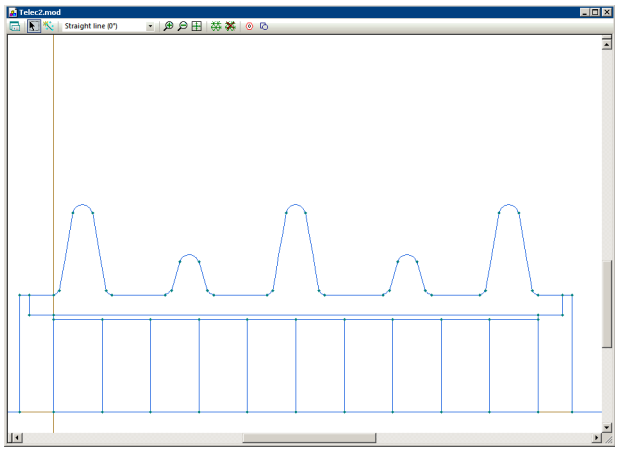


Arrester

www.quickfield.com/advanced/telec2.htm

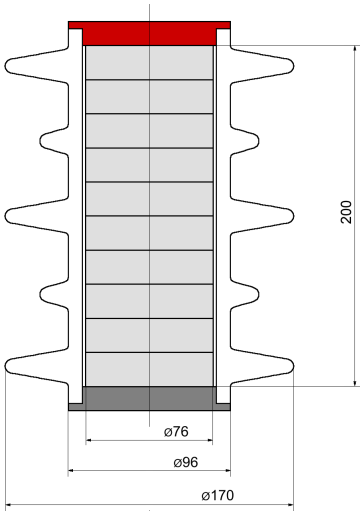
Voltage arrester is used to limit the over-voltages in electric circuit. This QuickField simulation is a good application for a non-linear **Transient Electric** analysis.

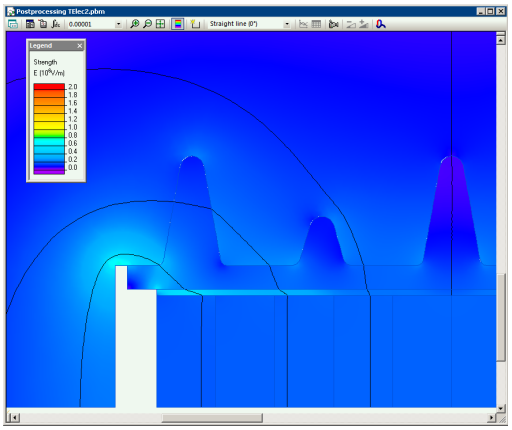
QuickField model



Axis of rotation is horizontal.

Sketch





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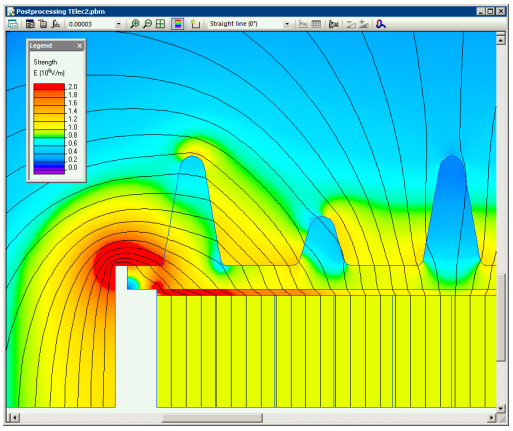

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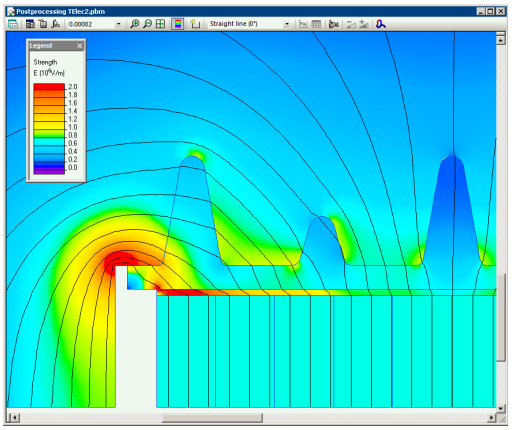
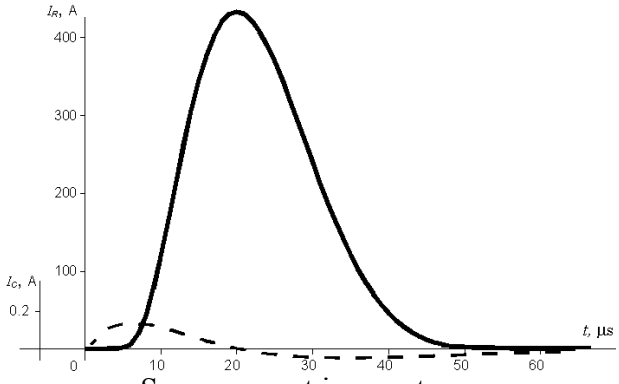


t=0.02 ms.

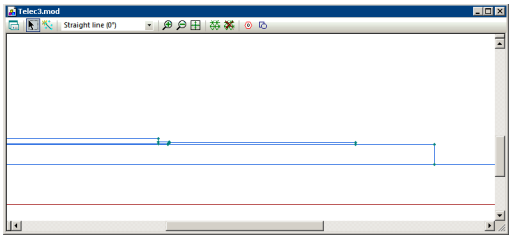
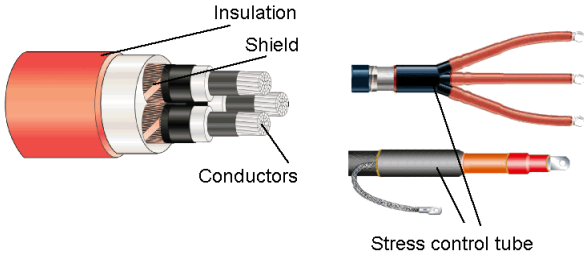


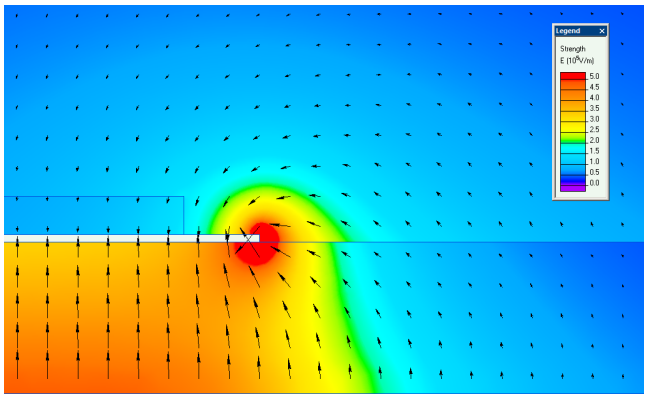
Surge current in arrester.

Stress control tube

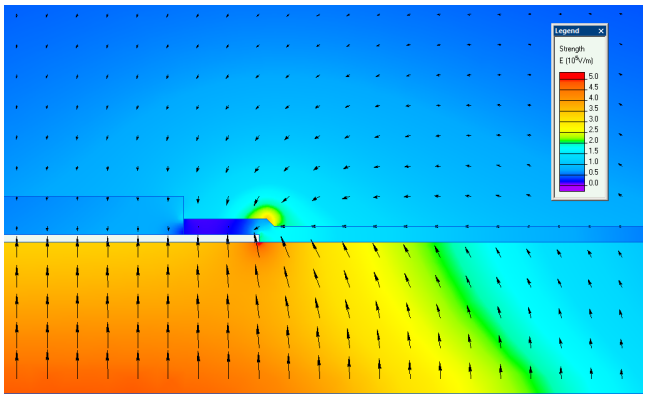
www.quickfield.com/advanced/telec3.htm

Stress control tube is used to reduce the electric stresses at the cable termination. **Transient Electric** simulation with QuickField helps to adjust and optimize design details.

QuickField model	Sketch
	
Axis of rotation is a horizontal one.	

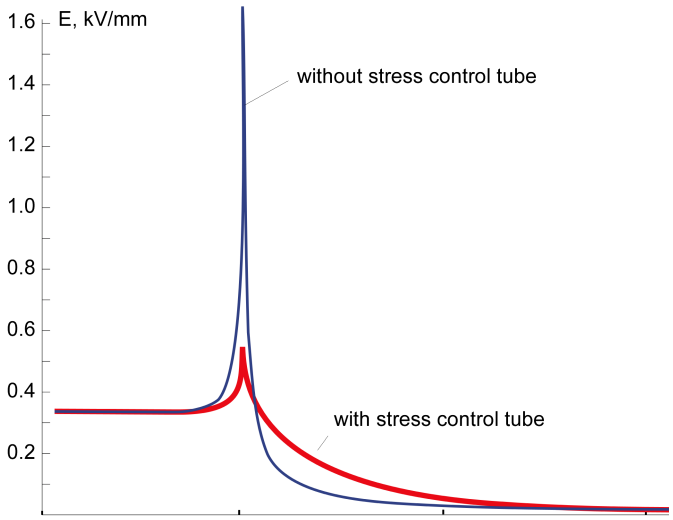


Without tube



With tube

With the stress control tube maximal electric stress is reduced from 1.6 to 0.5 kV/mm.

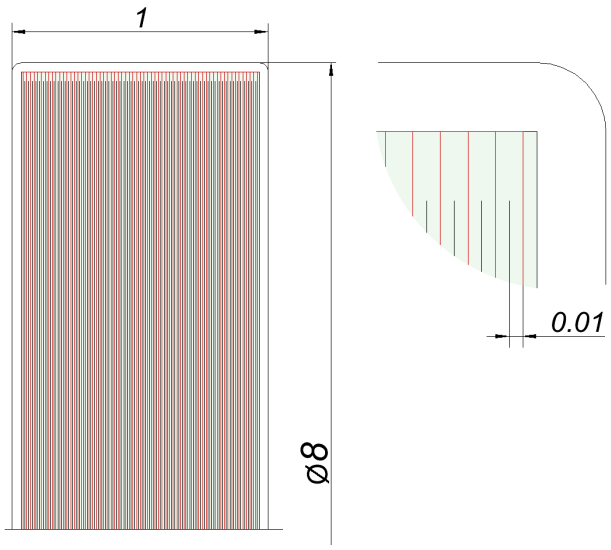


Capacitor

www.quickfield.com/advanced/hv_capacitor.htm

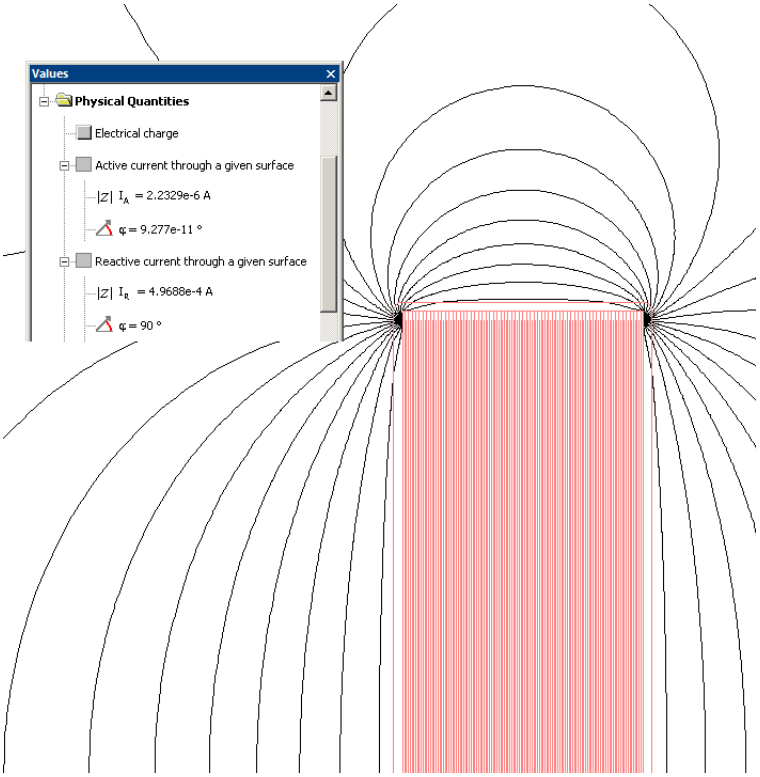
High voltage ceramic capacitor is used in electronic equipment. Electric field stresses in and around the capacitor and leakage currents are usual design concerns for such devices. QuickField **AC Conduction** simulation helps to analyze the electric fields and leakage currents distribution..

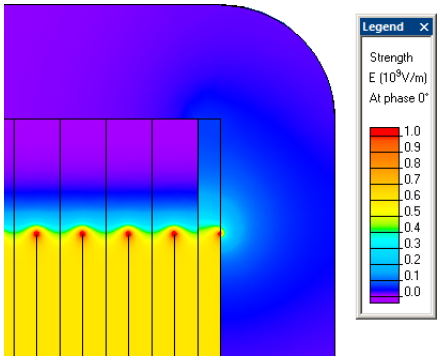
QuickField model



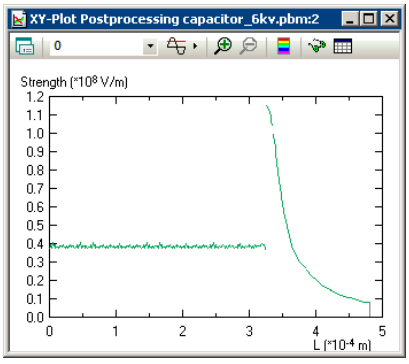
Axis of rotation is horizontal.

Sketch





Electric stress distribution

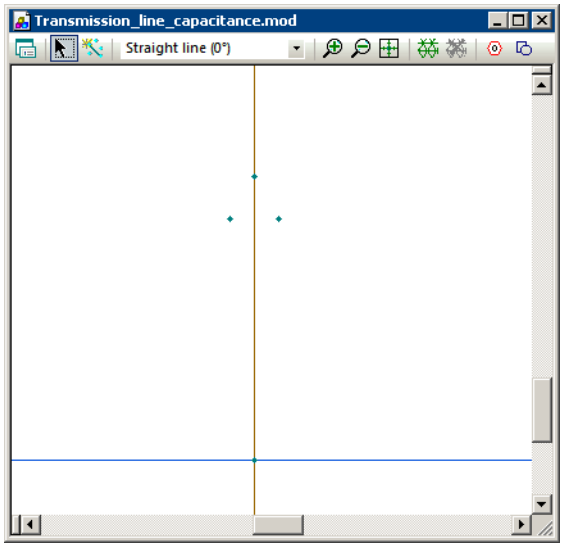


Transmission line

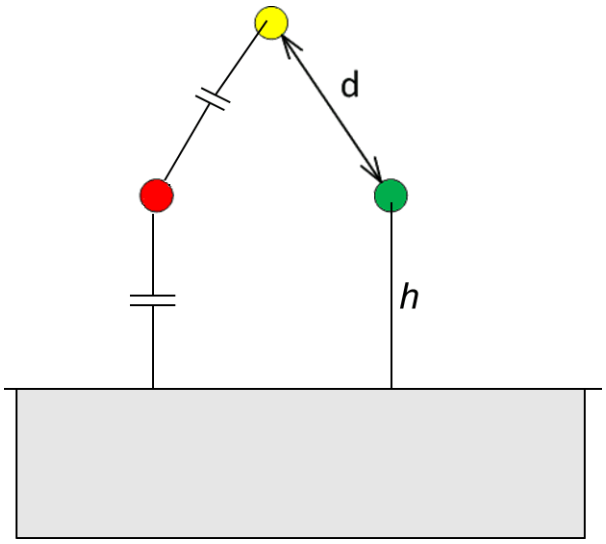
www.quickfield.com/advanced/transmission_line_capacitance.htm

Power transmission line design requires understanding of the self and mutual capacitances of all wires. This **Electrostatic** simulation with QuickField presents the automatic procedure for calculating the capacitance matrix of a 3-conductors transmission line.

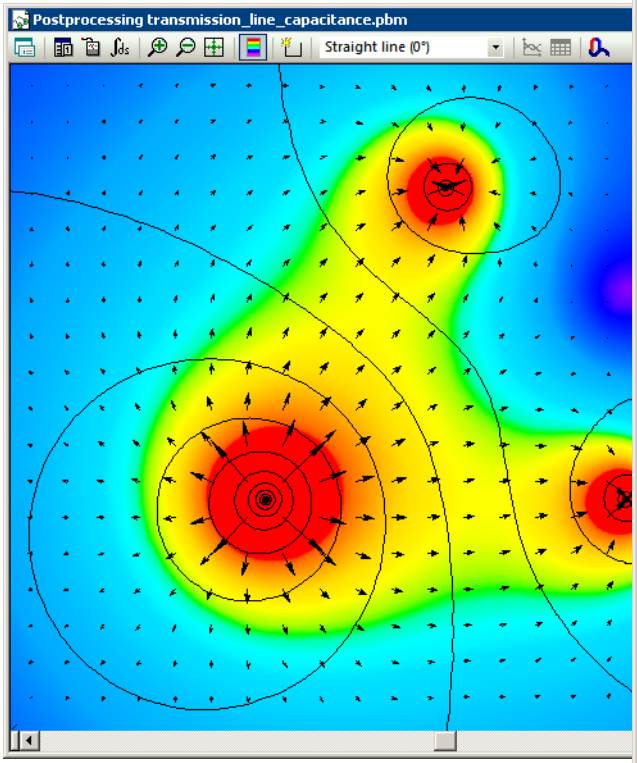
QuickField model



Sketch



Electric field stress (at some moment of time).



Self and mutual partial capacitances.