

Application of the Finite Element Method for Expanding the Capabilities of Educational Programs for Non-destructive Testing of Industrial Facilities



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Authors:

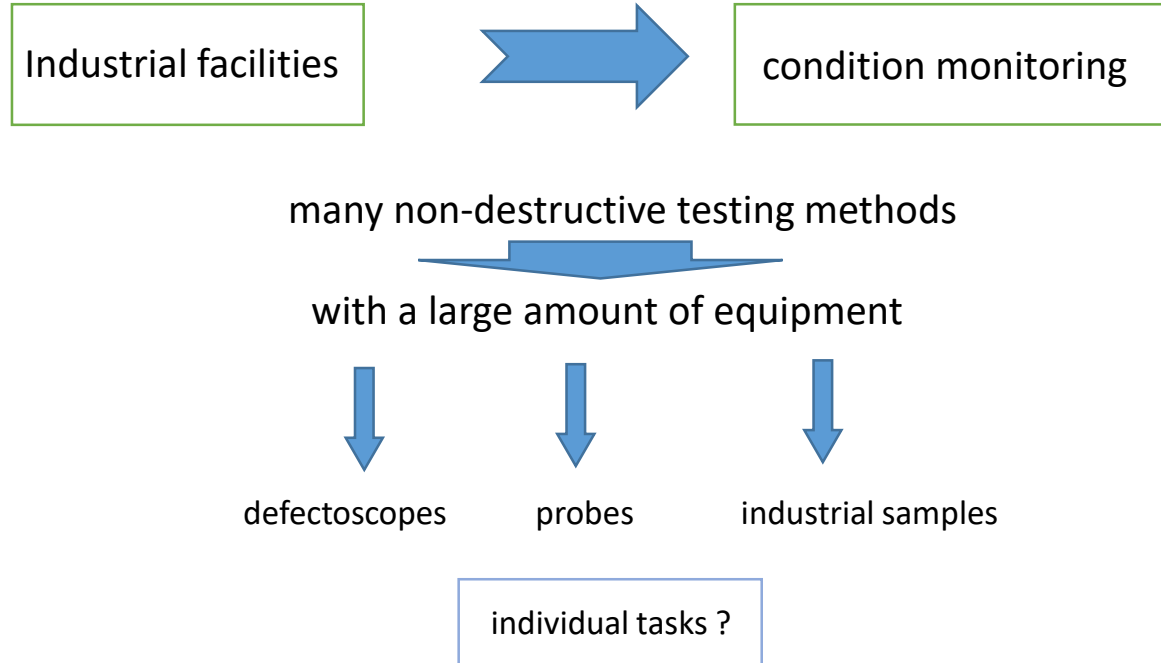
Andrey Khvostov

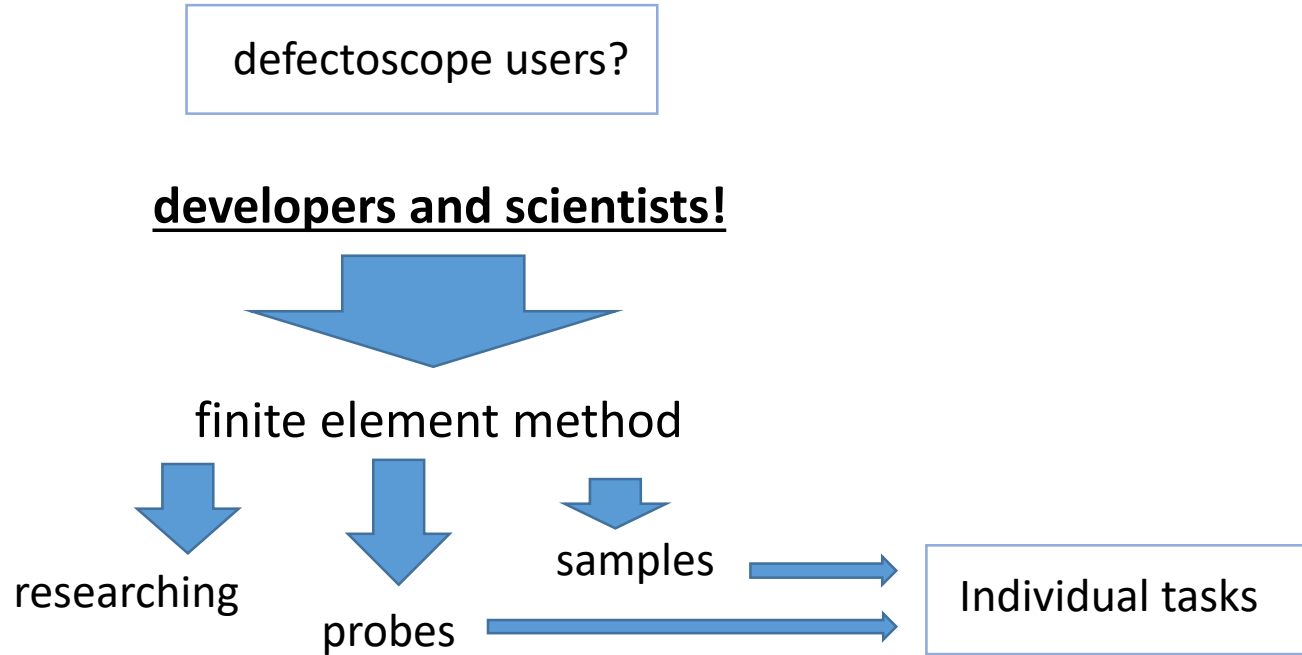
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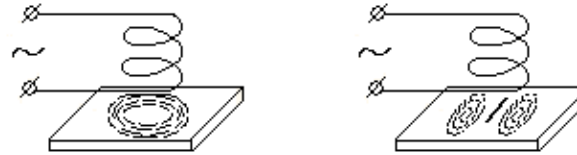


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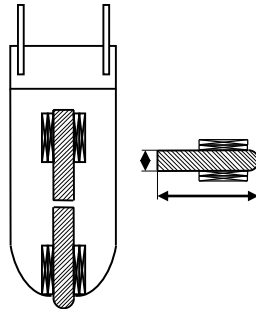




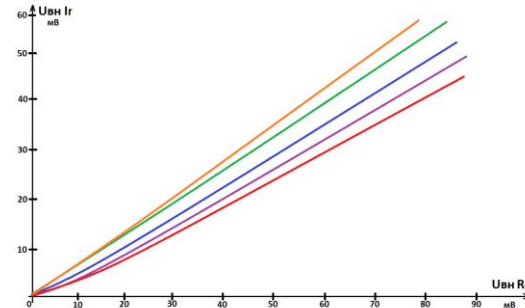
Eddy Current Testing



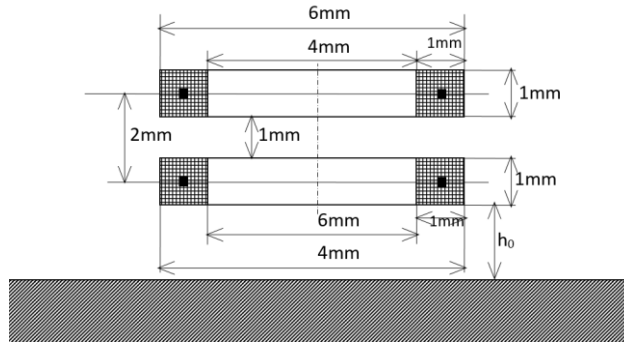
Eddy-current probe (ECP)



Hodographs



Real Eddy-current probe



Many other probe designs



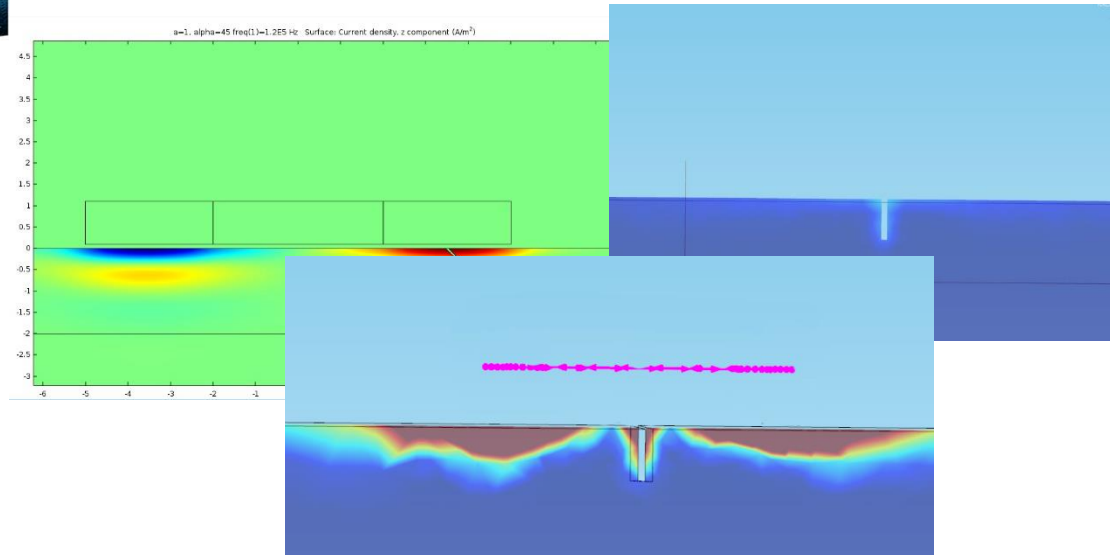
Real industrial testing sample





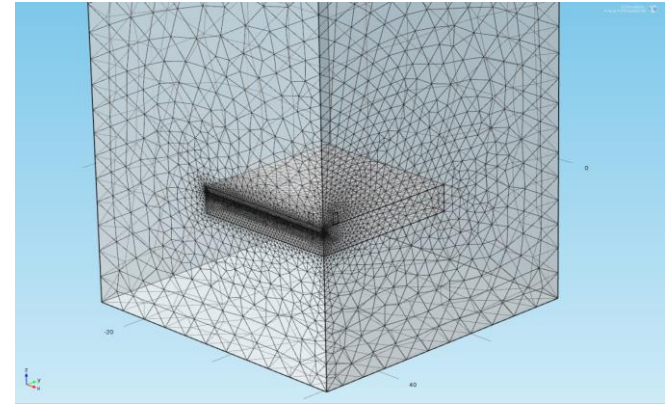
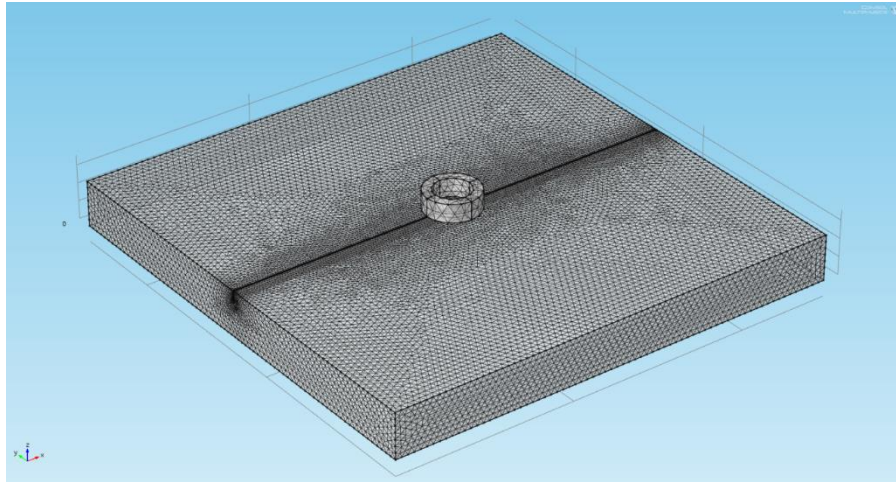
COMSOL Multiphysics software package

Usage examples



- + wide distribution
- + simplicity of its use
- + confirmation of the reliability

3-dimensional space



Mesh of the finite element model consisted of hexahedrons

Vector of the magnetic potential

$$\vec{B} = \text{rot}(\vec{A})$$

$$\vec{E} = -\frac{\partial \vec{A}}{\partial t} - \text{grad}(V)$$

Error of the mesh generation

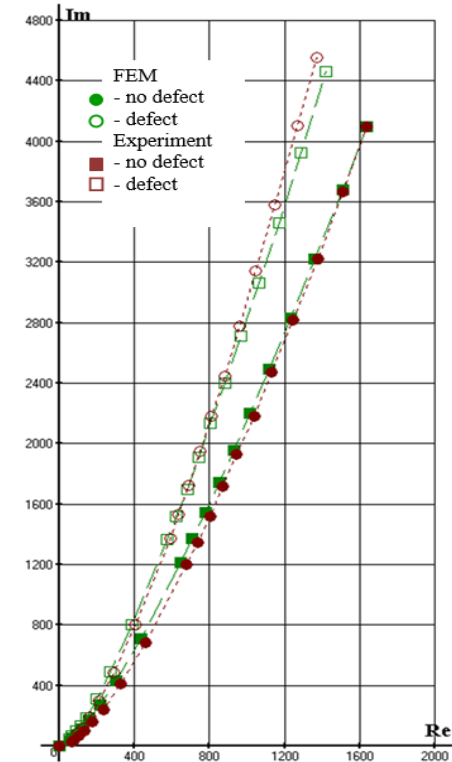




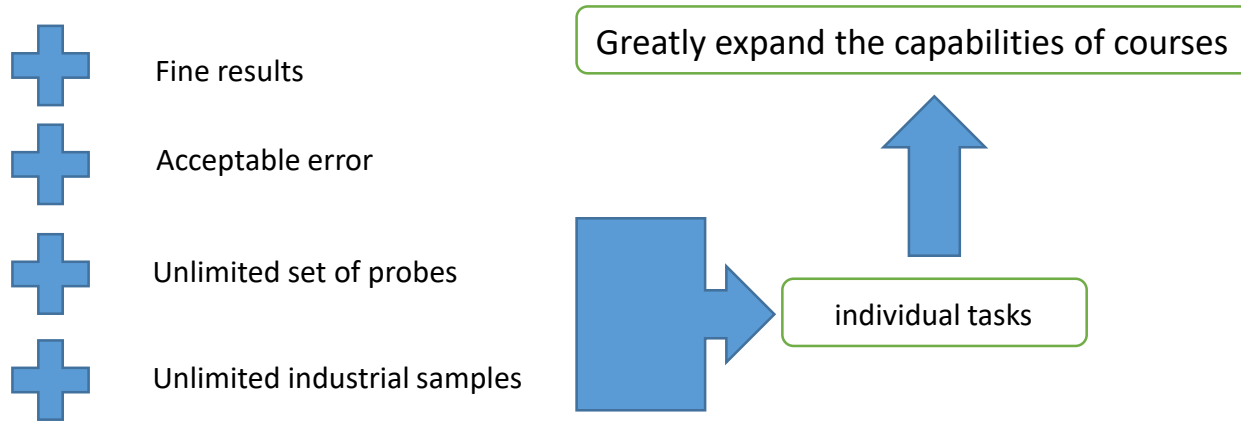
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comparative simulation
results using FEM
and a real experiment

with and without a defect



The results allowed us to evaluate the possibilities of the FEM using the example of the “Eddy-current testing” course:



Thank you for attention!

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