

FEIn: A Preprocessing software for FreeFEM++

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Agenda



- Overview
- FreeFEM++
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- Demonstration
- Conclusion

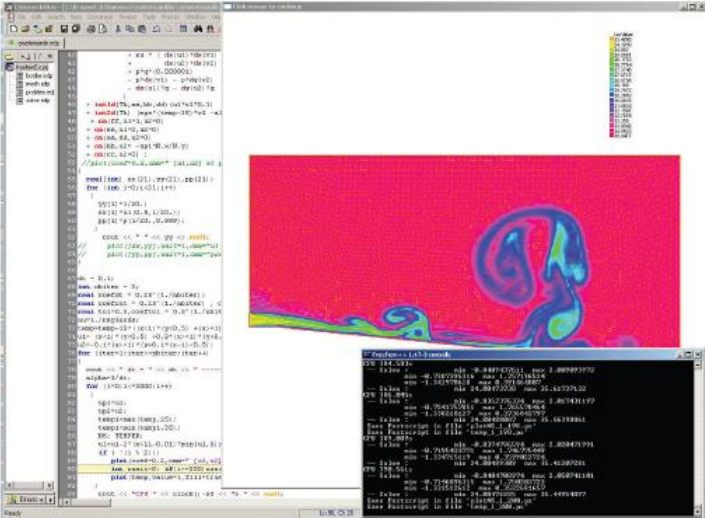
Overview



- „FEIn“ has been developed as an additional software to ease the use of „FreeFEM++“
- Development was done by Mr. Bernstein of BAM
- „FEIn“ and „FreeFEM++“ can be used for solving all kinds of problems by solving partial differential equations (PDEs) for the finite element analysis (FEA/FEM)

- BAM: Federal institute providing support for the German industry regarding safety and reliability in chemistry and material technology
- Section Z.5: Scientific Equipment Design

FreeFEM++



Source: FreeFEM++ Manual, www.freefem.org/ff++

- A program suite for meshing, solving partial differential equations and displaying of results
- Controlled by a scripting language (an idiom of C++)
- Developed by the team of Prof. Frédéric Hecht at Université Pierre et Marie Curie, Paris

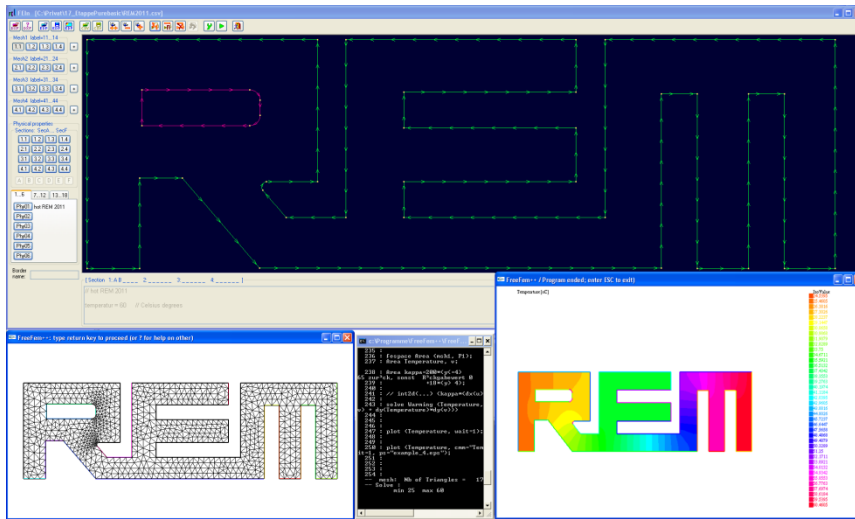
• Advantages:

- Very fast and lightweight program, free of charge (available for Windows, Mac OS X and Linux at www.freefem.org/ff++)
- High flexibility, problem setup is defined by the underlying PDE

• Problem:

- Geometry is defined in the scripting language source file, therefore it is hard to analyze actual components with complex geometries

FEIn



- „FEIn“ provides a GUI for importing 2D geometries in the widely used *.dxf Format
- For example, AutoCAD and many other, even free CAD programs can export these files

- Geometry data and the defined boundaries are exported to a prepared „FreeFEM++“ source file
- „FEIn“ recognizes key words in the source code and replaces them with geometry data or physical properties
- „FreeFEM++“ can then be started directly from „FEIn“

FEIn



Other Features:

- A *.dxf-File may contain several thousand elements
- Recognition of lines, circles (and arcs), ellipses (and arcs), polylines and points
- Multiple meshes can be generated
- Properties can be assigned to groups of boundaries/elements

Demonstration



Conclusion



- „FEIn“ extends the functionality of „FreeFEM++“ and makes it easy to use for mechanical and electrical engineers to solve actual problems
- Very fast, lightweight and stable
- Has been tested on Windows and Linux
- The combination of „FEIn“ and „FreeFEM++“ provides a cheap and reliable possibility for experimental and theoretical examinations of problems from materials research and physics in the education at universities and colleges

Thank you
for your
attention!