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1 Short overview

An all-purpose FEM simulation software for structural analysis:

*Code_Aster*

Plugged in a user-friendly environment: Salome_Meca
A large scope of capabilities

- Thermal and mechanical
- Statics and dynamics, linear or not
- Modal analysis, harmonic and random response
- \( \approx 400 \) finite elements: 3D, 2D, shells, beams, pipes …
- Wide range of loadings
- Interaction with other physics (coupled or not): fluid, soil structure computation, electro-magnetism …
Non linearities and specific models

• Contact, friction
• Large displacements, large deformations
• Behaviour models (≈ 100 constitutive laws)
• Porous media, fracture mechanics, damage, fatigue, welding, seismic analysis …
1 Short overview

A solver plugged in Salome environment
1 Short overview

A solver plugged in Salome environment
2 Why we make it

Specific requirements of nuclear industry

- Regulatory design, safety

Specific problems: ageing of structures, re-evaluation of margins

- Stakes differ from manufacturing industry and software vendors.

Research and developments

- Capitalization of know-how and models, quick transfer to engineering
- Mastering of source code, models …

Choice of in-house development
2 How we make it (some figures)

60 releases each year

200 in-house users

1,256 documents freely available (13,800 pages)

15 PHD for the 8 last years

250 new features in the code in 2007

2,000 tests runned for each release

200,000 CPU hours

4 training sessions, 40 listeners each

ASTER as a free software: 30,000 downloads, 10,000 hits a week
2 How we make it

- source lines x 1.000
- nb tests
- nb doc pages x 10
- nb in-house users
- CPU hours x100

Version 2 oct. 93
Version 3 juin 96
Version 4 oct. 2000
Version 5 nov. 2002
Version 6 déc. 2004
Version 7 déc. 2004
Version 8 déc. 2006
2 How we make it

A network of programmers (like a free software)

- A **core team** in charge of: kernel development, integration, distribution … [~20 engineers.year]
- **Applicative projects**: bring new models / developments [~40 engineers.year]
- **Continuous process**: no V cycle, no predefined specifications
- A **life cycle** of 2 years: the developped version is transfered to engineering after a qualification process
3 Focuses on capabilities (1/5)

- Structure finite elements
- Contact-friction
- Large deformations/rotations
- Driving forces and displacements …
3 Focuses on capabilities (2/5)

Damage
Fracture
Fatigue...
3 Focuses on capabilities (3/5)

Dynamics
Acoustics
Fluid forces
SFSI, SSI...
3  Focuses on capabilities (4/5)

Porous media and geomaterials
Civil engineering
Concrete…
3 Focuses on capabilities (5/5)

Multi-scale
Multi-physics
Coupling and
chaining ...
3 Focuses on capabilities : samples

• 3D simulation of excavation, damage, re-saturation and Darcy flow in a waste storage repository,
• Deformations of a complete core during several irradiation cycles,
• Extension and stop of a crack in a pressure vessel after a thermohydraulic transient,
• Computation of the leak flow in the containment,
• 3D crack propagation in a rotor,
• Simulation of a complete shaftline …
4 **Goals and stakes**

**High performance computing**
- Increasing size of models
- Super-computer trends

**Partnership policy**
- Free software consortium
- Research partnerships

**Interoperability**
- Easy coupling with other physics in Salomé environment

**Management**
- Simulation process: user-friendly, quality and reliability
- **While** Code_aster remains the place in which we capitalize researches

[http://www.code-aster.org](http://www.code-aster.org)
5 How to get Code_Aster stand alone?
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Home page

Welcome on the Code_Aster web page. You will find some documentation and a download page.

Most of this website has not been translated and is still in french. A link is available to compute automatic translation.

Please feel free to contribute by suggesting your translation!

Last news

New website - usage guide
November 2007

This is the new version of the Code_Aster website. You need to be logged-in to post messages on the forum anymore. You will have to create a new one by clicking on "Register" in the (...).
5 How to get Salome_Meca?

We are not in charge of the « free » distribution

... but we can give it to partners or to whoever wants to distribute it.

For instance: www.caelinux.com
Thanks