



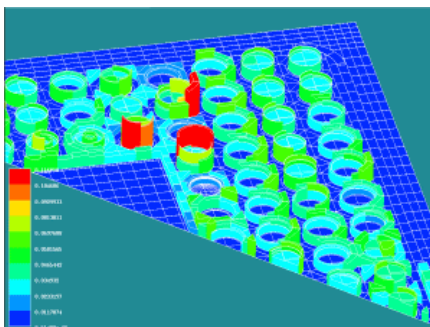
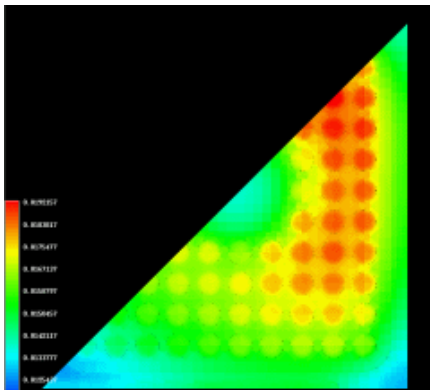
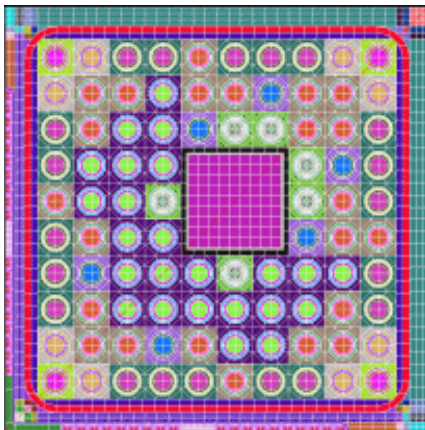
*“Thank you very much for your help. Your modification works fine and permits us to create the design we need.”*

Marc Leclere  
Engineer, AREVA NP SAS

# AREVA NP - CHARM

**Speed up the design of nuclear power plants using OPEN CASCADE software components.**

S u c c e s s w i t h O p e n C A S C A D E



## MISSION

- *Develop a 2D & 3D GUI application allowing to define different kinds of fuel assembly geometries in addition to experimental nuclear reactor cores.*
- *Mesh and assign physical properties to the models.*
- *Export the models in APOLLO2-A, MCNP and TRIPOLI solvers formats.*
- *Visualize the imported results of solids in colors and diagrams.*

## SOLUTION

- *Development of pre- and post-processor applications based on Open CASCADE Technology and SUIT platform: “CHARM 2D” for 2D and “CHARM 3D” for 3D models design.*
- *Development of a command line executable to ease the integration within the customer system-codes and the validation process.*

## RESULTS

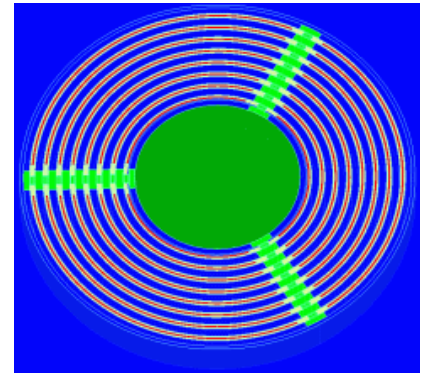
- *Speed up the creation of APOLLO2-A, MCNP and TRIPOLI files: automation of the process reduces the design time from months to hours.*
- *Visualization of models during the design process. Now the end-user can display the resulting model at each step of the design phase, without running a calculation.*
- *Visualization of solver results in different modes allowing comparison and analysis of results.*
- *An increasing number of concerned end-users including AREVA NP, AREVA TA, EDF R&D, CEA.*





## FACT FILE: AREVA NP

- AREVA NP is an AREVA group company dedicated to the design and construction of nuclear power plants and research reactors, engineering, instrumentation & control, modernization, maintenance and repair services, components manufacture and supply of nuclear fuel.
- World leader in the design and construction of nuclear power plants, and the supply of fuel, maintenance and modernization services.
- Serving as Original Equipment Manufacturer (OEM), AREVA NP has built about 100 nuclear plants in 11 countries that provide about 30% of the world's total installed nuclear power capacity and its experienced resources remain focused on the local needs of individual clients, wherever in the world they may be.



S u c c e s s w i t h O p e n C A S C A D E

## MORE ABOUT THE PROJECT

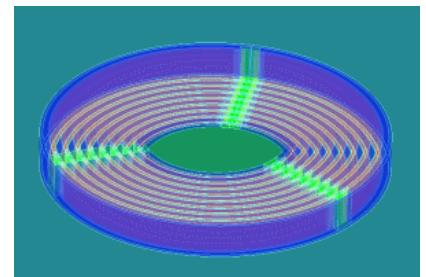
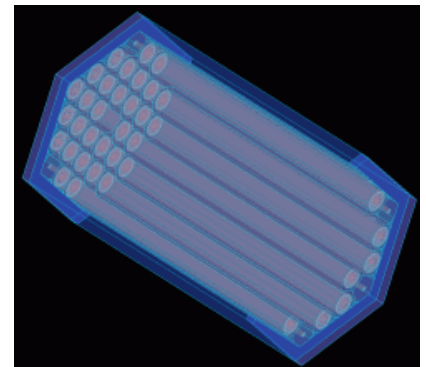
One physical model could be analyzed using several solvers. The problem is that most of these solvers use absolutely different formats for geometrical and physical data representation. These formats are hard to understand for an ordinary engineer. Besides, in some cases, a simple change of the geometrical model led to retyping most of the data.

The CHARM application allows constructing any physical model from scratch or from a simple XML file format using native visual representation of the result and exporting this model into any format: 2D mesh for APOLLO2-A, 2D or 3D volumes for TRIPOLI, 2D or 3D cells for MCNP with the usage of universes in the geometry representation, or a flat list of cells. Using the CHARM application it is possible to define most of the physical parameters, required by the solvers.

The user could employ predefined types of simple geometry that is widely used in the nuclear cores design. For these predefined types there are particular meshing rules, application behavior in case of one object overlapping by another one. This simplifies the construction of geometrical models.

In case the necessary model cannot be designed using only standard geometrical types it is possible to define a new geometrical type and use it.

Results for computation are simply imported in the CHARM GUI and could be visualized in several modes in colors and/or in diagrams. Also it is possible to visualize the results of algebraic operations between two solver results, or use different types of results: for example, if one result array is "mass" and another array is "volume", it is possible to visualize "density" by applying the "division" operator: "mass/volume".



## CONTACT US NOW:

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