

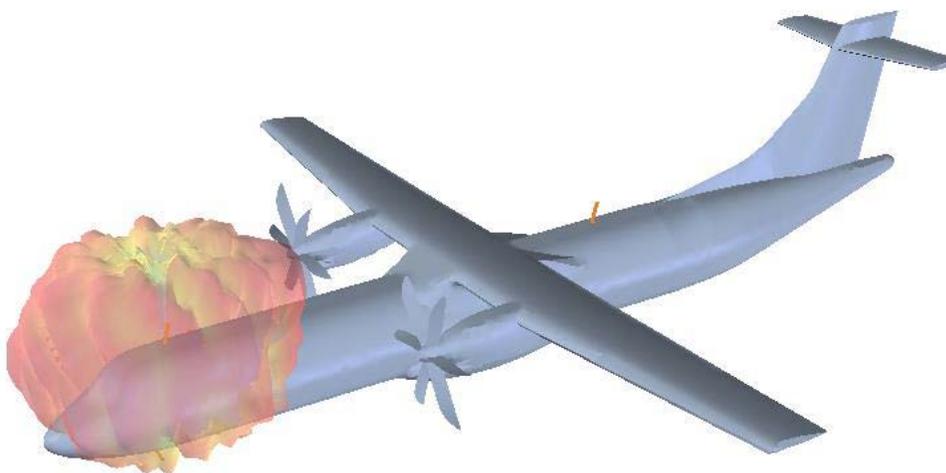
PRACE SHAPE and NEXIO SIMULATION: Amping up electromagnetic modelling

NEXIO SIMULATION is a French SME and subsidiary of Nexio Group, develops electromagnetic simulation software called CAPITOLE-EM to study the electromagnetic behaviour of any product during the design process, before the manufacturing phase. After a first step performed locally in France using the HPC-PME initiative, their PRACE SHAPE Project has allowed them by accessing to HPC resources and expertise in HPC and numerical simulation to jump from a personal computer version of this software to an HPC version.

Electromagnetic simulation is more frequently used these days, due to the increase of communicating devices such as mobile phones, modems, etc. Studying the effects of interferences between pieces of equipment becomes essential for large industrial companies in aeronautics, space, automotive, etc. to improve the performances of the transmitting and receiving systems or antennas.

NEXIO SIMULATION proposes solutions for electromagnetic simulation problems with larger frequencies and model dimensions that lead to linear systems with millions of unknowns: one of the biggest challenges that researchers in this field encounter. Such solutions call for special numerical techniques which are able to highly reduce the numerical effort and complexity of the solution as well as the necessary used memory.

“These techniques are usually based both in physical and mathematical properties. However, there is a certain point where these methods are not enough and we need to add some more gain. There it enters the era of parallelization and HPC systems. Parallel codes can extremely reduce computational times if they have a good scalability with the number of cores. Getting to an efficient and optimized parallel code requires some expertise and resources which are hard to reach for a SME,” says Pascal de Resseguier of NEXIO SIMULATION. “We expect that half of the future sales of CAPITOLE-EM will come from the HPC-version developed through this SHAPE Project.”



Classical set-up for an antenna placement problem. Several position configurations are analyzed obtaining the radiation pattern and input impedance in the presence of the plane © NEXIO SIMULATION



PARTNERSHIP FOR ADVANCED COMPUTING IN EUROPE

The results of the project were presented during the SHAPE parallel track of PRACEdays14:

<http://www.prace-ri.eu/pracedays14-presentations/>

Project details

Title: CAPITOLE-HPC+
Leader: Mr Pascal de Resseguier, NEXIO SIMULATION – Nexio Group, France
Collaborators: Dr José Maria Tamayo-Palau, NEXIO SIMULATION – Nexio Group, France
Nicolas Mignerey, GENCI, France
Raymond Namyst, Inria, France
Research field: Engineering and Energy
Resource awarded: 200,000 core hours on MareNostrum @ BSC, Spain

More detailed results of this project, as well as the other 10 first SHAPE projects are available on the PRACE website: <http://www.prace-ri.eu/shape-pilot-projects/>

About NEXIO SIMULATION

Since 2005, NEXIO SIMULATION develops simulation software in electromagnetism. CAPITOLE-EM software is the result of a long experience gained thanks to research projects in many industrial fields such as defence, aerospace, space, marine, etc. It offers outstanding performance in terms of speed and memory space saving, which allows an easy use by everyone, and especially for SMEs. NEXIO SIMULATION joined NEXIO Group (<http://www.nexiogroup.com>) in 2012, specialized in electromagnetic compatibility. NEXIO SIMULATION becomes the Simulation Software cluster of the Group and allows pooling expertise to provide a range of comprehensive solutions.

About SHAPE

SHAPE, the SME HPC Adoption Programme in Europe is a pan-European, PRACE-based programme supporting HPC adoption by SMEs. The Programme aims to raise awareness and equip European SMEs with the expertise necessary to take advantage of the innovation possibilities opened up by High Performance Computing (HPC), thus increasing their competitiveness. <http://www.prace-ri.eu/shape>

About PRACE

The Partnership for Advanced Computing in Europe (PRACE) is an international non-profit association with its seat in Brussels. The PRACE Research Infrastructure provides a persistent world-class high performance computing service for scientists and researchers from academia and industry in Europe. The computer systems and their operations accessible through PRACE are provided by 4 PRACE members (BSC representing Spain, CINECA representing Italy, GCS representing Germany and GENCI representing France). The Implementation Phase of PRACE receives funding from the EU's Seventh Framework Programme (FP7/2007-2013) under grant agreement RI-312763. For more information, see www.prace-ri.eu

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