

Development of explicit non-linear reference software space applications

The French NCC: CC-FR, dedicated to HPC, HPDA , AI technologies, and Quantum Computing brings together the community of technology providers and users. CC-FR federates the HPC, HPDA, AI and Quantum computing ecosystem and supports SMEs on the use of intensive computing, high-performance data analysis and artificial intelligence.



Organisations Involved

The NCC CC-FR is managed by **TERATEC** the European Pole of Competence in high performance digital simulation, in partnership with **CERFACS** the European Center for Advanced Research and Training in Scientific Computing, with **Inria Academy**, a continuing education program dedicated to open source software, with **CRIANN**, the regional computer centre and digital applications of Normandy , and **ROMEO** the Regional Computing Center of the University of Reims Champagne-Ardenne.

ABSTRAO (abstrao.com), is specialized in integrating numerical modelling into the analysis and optimization of systems subjected to extreme loading.

ABSTRAO proposes digital solutions, training and studies of materials and structures under extreme loading.



Technical Challenge

Abstrao is specialized in integrating numerical modelling into the analysis and optimization of systems subjected to extreme loading, and needed a first evaluation of the scalability of a multi-GPU HPC version of the code, for the Development of explicit non-linear reference software for space applications.



Figure 1: Hypervelocity impact test result at 7.2km/s

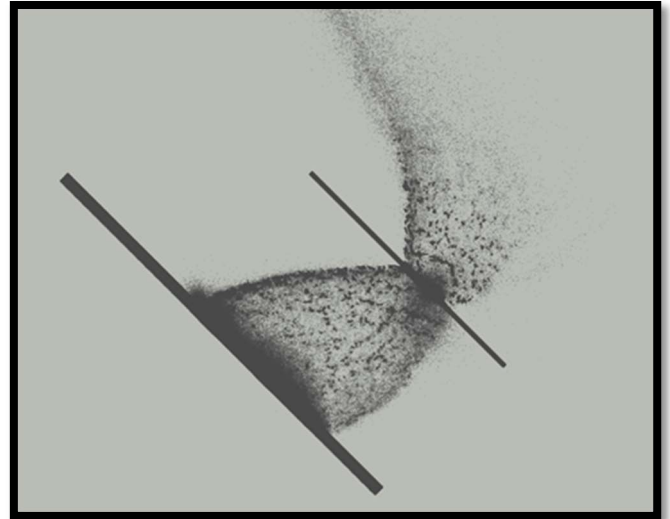


Figure 2: ABSTRAO Solver result

Solution

Technological demonstrations through applications linked to hypervelocity impacts of space debris on satellite protective structures.

Business impact

The collaboration between CALMIP (One of the 21 mesocentres involved in CC-FR) and ABSTRAO was decisive in the first evaluation of the ABSTRAO HPC Solver performances. This partnership has leveraged CALMIP's infrastructure and technical expertise, enabling a comprehensive and rigorous assessment of the solver's capabilities.

Benefits

- Very good weak and strong scalability (90%) on 30xA100 on *Turpan* - MESONET ARM supercomputer
- Significant progress in code maturity

- HPC
- Simulation
- Multiphysics
- Material
- hypervelocity impacts
- Industry sector: Space
- Technology: HPC, Simulation

Contact:

Dr Karim Azoum

<https://www.linkedin.com/in/karim-azoum-45011710a>

Email: Karim.azoum@teratec.fr

+33 762 740 360