

# HIGH PERFORMANCE COMPUTING INSTITUTE - ICI

## DEMOCRATISING HIGH PERFORMANCE COMPUTING

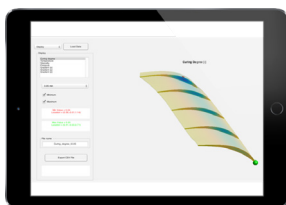
"Institut de calcul intensif - ICI"

Nantes, Pays de La Loire - France

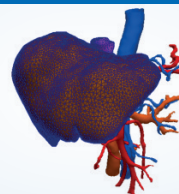
The Institut de Calcul Intensif (ICI) is a HPC Research Institute established at Centrale Nantes in January 2015, award winner in the Pays de La Loire ConnecTalent Project Call. It associates a high performance computing research laboratory and supercomputing facilities. The objectives of this project are related to the democratization of numerical tools for massively parallel computing for a wide range of applications and challenges.

### SERVICES

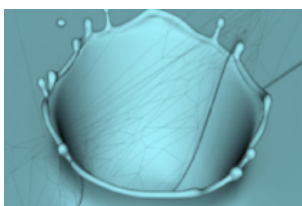
- > **Computational Vademecums** (parametric solutions) & simulation apps development is a unique field of expertise of the ICI.
- > **ICI-Tech** offers a massively parallel framework for scientific high performance computing: massively parallel adaptive APIs and higher order finite elements and meshing, industrial, academic and teaching software applications.
- > **ICI SuperComputing Centre** has the fastest and largest French Tier2 class machine, hosting an efficient BULLx DLC Parallel Scalar Supercomputer running 6384 nodes with a 280 Tflop/s peak performance.



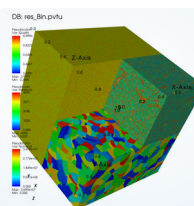
**COMPUTATIONAL**  
Urban Composites  
Physics Bio Processing  
Engineering Rheology



**ANISOTROPIC**  
Multiphase  
**CFD & MESH**  
ADAPTATIVITY



**DATA**  
BASED  
ENGINEERING



Advanced Model  
Order **REDUCTION**  
.....  
Massively  
**PARALLEL**  
COMPUTING



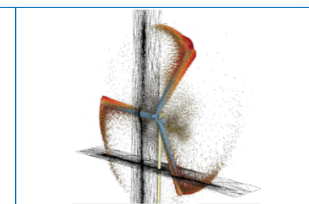
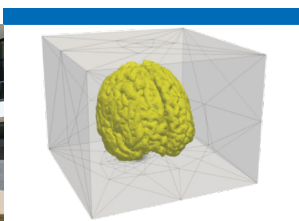
## RESEARCH FIELDS

ICI promotes scientific advances and technological innovations through advanced computational modelling, simulation and visualisation methods and tools.

- > **Supercomputing and Innovative Parallel Methods:** innovative and massively parallel numerical techniques for multiphase computational fluid dynamics, such as anisotropic mesh adaptation (theory and applications) and its coupling with immersed volume methods; imaging, with automatic reconstruction of numerical models from 3D images, offline and online computations.

- > **Advanced Modelling & Numerical Methods for Engineering:** Advanced Model Order Reduction methods for real time simulation, optimization, inverse analysis, control, uncertainty quantification and real time decision making in computational physics and engineering; Data based engineering science and technology for materials, processes, structures and systems: monitoring, times series and images analysis. Data-driven, data-mining, machine and manifold learning and BigData. An ESI Group chair supports these research activities.

- > **Engineering Applications:** Multiscale Computational Composites Processing and Rheology, from the flowing microstructures and flows in microstructures in suspensions or nanocomposites, to process simulators applied to RTM, SMC, compression, etc. by developing homogenization and upscaling techniques; bio-engineering and bio-physics, computational surgery for real time simulators, computational anatomy and statistical shape analysis for patient specific treatment; urban modelling and simulation and building physics.



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