

Nonlinear Structural Analysis Open Software FrontISTR

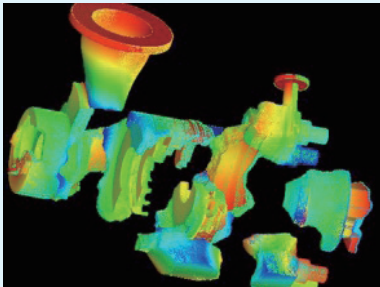
FrontISTR

Nonlinear analysis functions are deployed on a parallel FEM basis

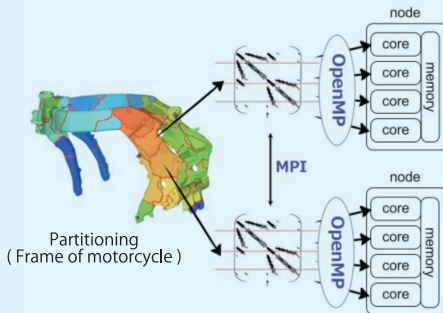
Running on a note PC, PC clusters and supercomputers
 FrontISTR provides innovative tools for practical and advanced structural analysis

Feasibility Studies

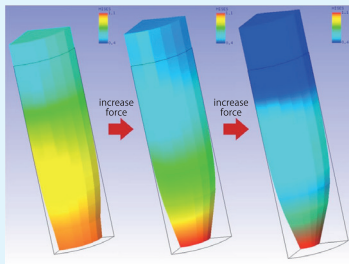
Large-scale parallel analysis



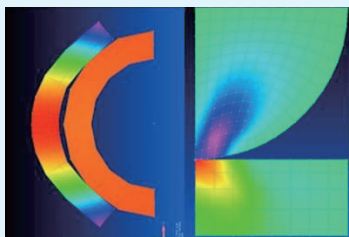
Domain decomposition for parallel computing



MPI-OpenMP hybrid parallel

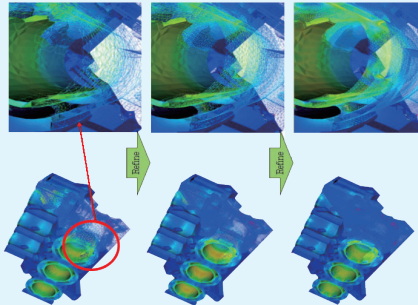


Elasto-plastic analysis (Forming of bar)

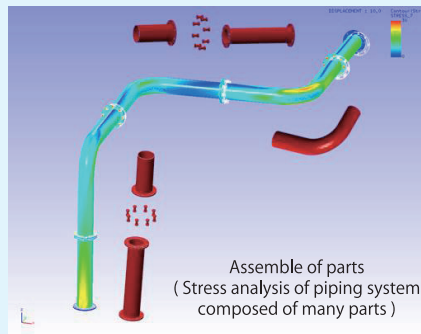


Contact analysis
 (Contact point transfer, Hertz contact problem)

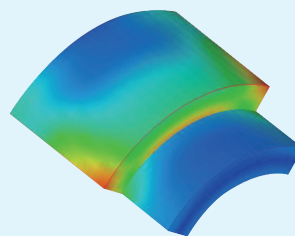
Accurate assembled structure



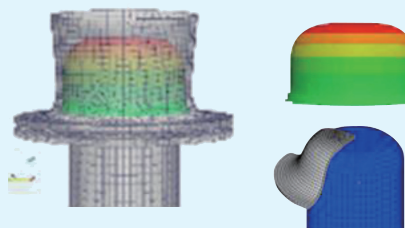
Accurate analysis aided by 'Refiner'
 (Thermal stress analysis of engine block)



Assembly of parts
 (Stress analysis of piping system composed of many parts)

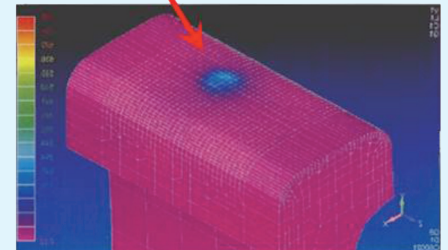
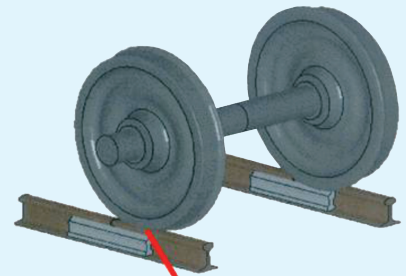


Contact indentation of cylinders

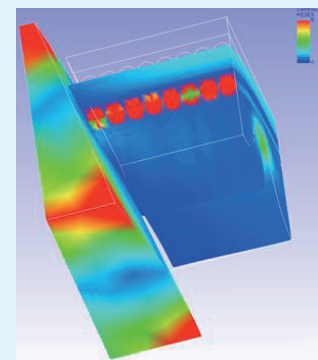


Cupping press simulation

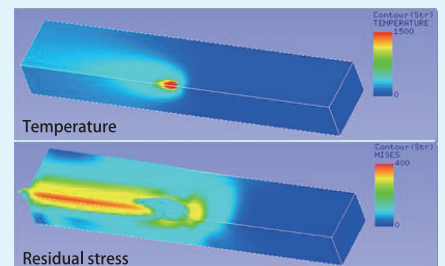
Material & geometrical nonlinear



Rolling contact between fast running train's rail and wheel



Frictional power transmission belt

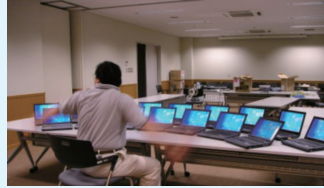


Thermal-elastic-plastic analysis of welding residual stress

Massively parallel, PC cluster, Cloud



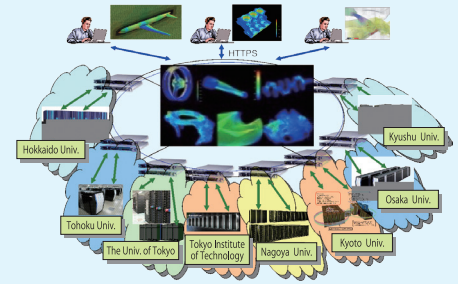
Earth Simulator



Win-note cluster



PC cluster



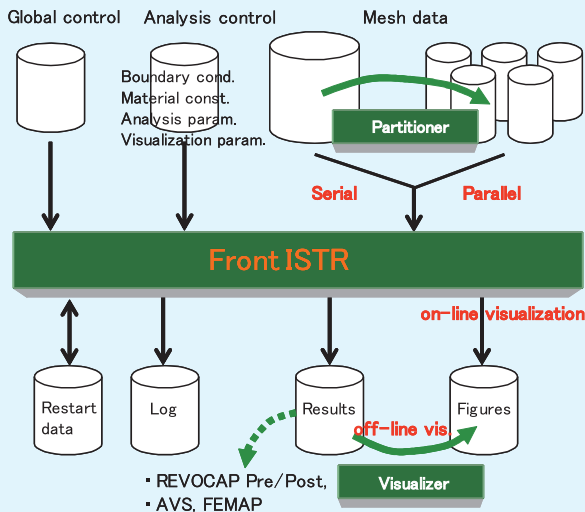
CAE supercomputer cloud

Functions

Function	Supported contents	
Static linear	(Including thermal stress analysis)	
Static nonlinear	Material	Hyper-elasticity/Thermal-Elastic-Plastic/Visco-Elastic/Creep, Combined hardening rule
	Geometry	Total Lagrangian / Updated Lagrangian
	Boundary	Augmented Lagrangian/Lagrangian multiplier method, Finite slip contact, Friction
Dynamic linear	Explicit method / Implicit method	
Dynamic nonlinear	Explicit method / Implicit method	
Eigen value	Lanczos method (considering differential stiffness)	
Heat transfer	Steady / Non-steady (implicit), Material nonlinear	
Element type	Tetra/Hexa/Prism, Shell, 1st /2nd order, Incompatible mode, SRI	
Utilities	User's subroutine, Restart, Step control of boundary conditions	

Function	Advanced characteristics
Hierarchical mesh refinement	Analysis of large-scale accurate models with REVOCAP_Refiner
Assembled structure	MPC-preconditioned iterative solver, Finite Slip Contact, Friction
Multigrid method	Convergence acceleration utilizing hierarchical meshes
Enhanced parallelism	Efficient parallel computation using $O(10^5)$ nodes
Parallel solver	Preconditioned iterative solvers / Parallel direct solver
Parallel visualization	Surface/Volume rendering, on-line visualization
Coupled analysis	Fluid-structure analysis with FrontFlow and REVOCAP_Coupler

Simple procedure for parallel computing

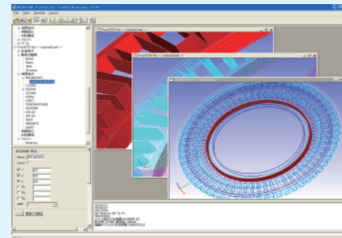


SPMD (Single Program Multiple Data) program performs parallel computations when mesh data is decomposed by the partitioner.

FrontISTR is supported by the project "Research and Development of Innovative Simulation Software (RISS)". FrontFlow/blue and REVOCAP are a registered trademark of the Center for Research on Innovative Simulation Software (CISS), IIS, The University of Tokyo. All registered trademarks belong to their individual owners.



Pre/Post processing



Screenshot of REVOCAP Pre/Post

REVOCAP Pre/Post, which is also being developed at the project (*), is available. At the pre-processing stage, IGES data is read, and the input data for FrontISTR is obtained through mesh generation, assembly and BC settings.

An alternative to post-processing, FrontISTR can generate files for AVS and FEMAP

Documents / Examples

Installation manual / User's manual / Tutorial guide (currently, in Japanese only). 15 examples for various type of analyses.

Platforms

OS : WindowsXP(32bit) / Linux(32bit, 64bit),
 Executable module is available for Windows.
 C compiler : gcc, Intel C Fortran compiler : Intel Fortran
 Supercomputers : FX10(The Univ. of Tokyo), PRIMERGY(Kyushu Univ.),
 Earth Simulator, Kei, etc.

Please contact us if you would like to use or customize this software.
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