NX Nastran 10.x – New features

Dynamics

- Output ply-layer stresses and strains for frequency response (SOL 108 and SOL 111), random response (SOL 108 and SOL 111) and transient response (SOL 109 and SOL 112) analyses for laminate composites modeled with solid elements or shell elements
- Compute Von Mises stress and strain by default for a deterministic frequency response analysis in SOL 108 or SOL 111 when stress and strain results are requested
- Write the output data blocks that contain modal and panel contribution results to the .op2 file for postprocessing acoustics analyses

Multibody dynamics

- Write the full modal damping matrix to standard and state-space MATLAB files, standard and state-space OP4 files and ADAMS MNF files by default

Rotor dynamics

- Specify the reference rotor speed that the software uses to compute the reduced modal basis for a SOL 107 rotor dynamic solve with complex modal reduction
- Define new stiffness and damping terms for CBEAR elements, such as the translational stiffness and viscous damping in the axial direction; the coupling terms for translational stiffness and viscous damping between the axial direction and axes in the plane normal to the axial direction of the rotor; the rotational stiffness and viscous damping about axes in the plane normal to the axial direction; and the coupling term for rotational stiffness and viscous damping between the axes in the plane normal to the axial direction of the rotor
- Model CBEAR element stiffness and viscous damping as functions of speed and displacement, or speed and force for direct frequency response (SOL 108), direct transient response (SOL 109), modal frequency response (SOL 111) and modal transient response (SOL 112)
- Specify that the software uses composite relative displacements or composite relative forces when it looks up speed and displacement-dependent, or speed and force-dependent bearing stiffness and bearing viscous damping
- Optionally include the time-dependent coupling terms in the equation of motion for SOL 107, 108 and 109 to perform rotor dynamic analysis without any symmetry restriction on the rotors in these solutions
- Model interconnected coaxial rotors in a rotor dynamic analysis. Interconnected coaxial rotors are concentric rotors in which one rotor is supported by the other
- Improve the computational efficiency of a SOL 107 rotor dynamic solve by applying a superelement-style reduction to the rotors

New multistep nonlinear solution 401

- SOL 401 is the structural solution used by the new NX multiphysics environment within the NX Advanced Simulation product. The NX CAE 10 multiphysics environment supports all combinations of structural-to-thermal and thermal-to-structural coupling with the NX Thermal solution. SOL 401 is also supported as a standalone NX Nastran solution

Element and grid point enhancements

- Stiffness, mass and loads for the CTRAX3,CQUADX4, CTRAX6, CQUADX8, CTRIAX, and CQUADX elements are now are based on a 2*PI section basis instead of on a per radian section basis

Advanced nonlinear

- Use a new potential-based fluid element for SOL 601,106 that can be used in a static analysis in which the pressure distribution in the fluid and the displacement and stress distribution in the structure is of interest
- Define strain-rate dependent plastic material in SOLs 601 and 701 to increase the yield stress with an increase in strain rate
- Use the new 3D shell element in SOLs 601 and 701 to account for the change in thickness and the shift of the shell mid-surface from the halfway position for a large strain analysis
- Define shell composites with the PCOMPG entry, which has global ply IDs for SOL 601
- Optionally define axisymmetric, plane stress and plane strain elements on the XY plane for SOL 601 and SOL 701
- Output results for the bolt loading iterations in SOL 601
- Use the MATCRP bulk entry to alternately define the power creep law in SOL 601.

Optimization

- Handle large optimization jobs for SOL 200 using the enhanced Siemens Analytic Design System (SADS) optimizer that the Design Optimization Tools (DOT) optimizer may not be able to handle in terms of the number of constraints and design variables

Improved RC file settings

- Create a more efficient and robust out-of-the box experience
- *memory*: Requests an amount of open core memory for a job. The new RC file setting .45*physical requests the fraction .45 of the total physical memory on your machine. For example, if you run NX Nastran on a machine which has 100Gb of physical memory, the new RC file setting will request 45Gb. The program default is memory=estimate.
- *smemory*: Specifies the memory to reserve for scratch memory. The new RC file setting 20.0X requests 20 percent of the total memory requested with the keyword memory for the scratch memory portion. The program default is 100 buffers.
- *buffpool*: Specifies the memory size of the buffer pool. The buffer pool is a portion of the total memory used to cache database memory. The new RC file setting 20.0X requests 20 percent of the total memory requested with the keyword memory for the bufferpool. The program default is 51 buffers.
- *buffsize*: Specifies the size of a buffer. A buffer is the data size NX Nastran uses for I/O. The new RC file setting defines a buffer as 32769 words. The program default is buffsize=8193 words.

New graphics processing unit computing

- Solve jobs using graphics processing unit (GPU) computing to divide computations across a large number of relatively small, inexpensive cores to speed solution time of large problems
- Supports Windows and Linux operating systems