SIEMENS
Ingenuity for life

NX Nastran – Superelements

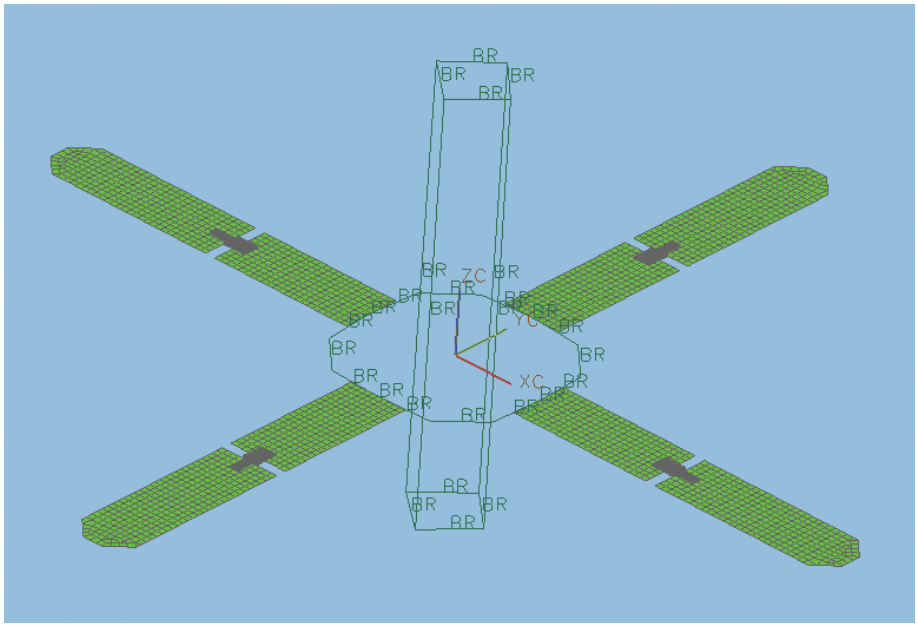
Efficiently perform complex system-level analysis for very large FE models

Benefits

- Accelerate innovation through enhanced solution efficiency
- Reduce product design risk through the ability to perform more iterations
- Enable enterprise-wide collaboration by combining models from different sources (internal and external) and masking proprietary data
- Maximize output of precious computing resources; reduce the amount of memory and disk space required

Summary

Despite the ever-increasing power of computers, finite element (FE) models are continuing to get larger, which means that finite element analysis (FEA) solutions can require hours of compute time. NX™ Nastran® software, which is part of the Simcenter™ portfolio of simulation tools, is used to solve structural, dynamics and acoustics simulation problems. NX Nastran solves large systems of equations efficiently using sparse matrix algorithms. However, the NX Nastran – Superelements module offers even greater solution efficiency. NX Nastran – Superelements is an add-on module to NX Nastran – Basic and plays a key role when solving very large and complex finite element models by decomposing larger structures into equivalent sets of smaller substructures called superelements. NX Nastran – Superelements can be used with all NX Nastran analysis capabilities and is particularly efficient in large, full-system analysis such as an entire aircraft, vehicle or ship, and performs incremental and partial assembly solutions.

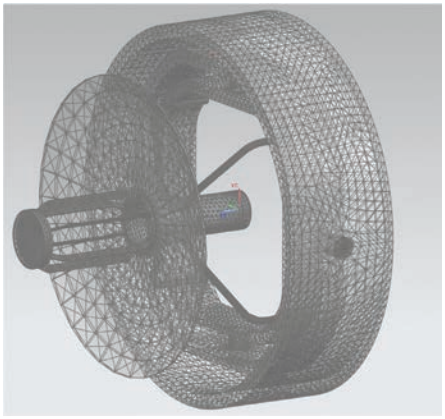


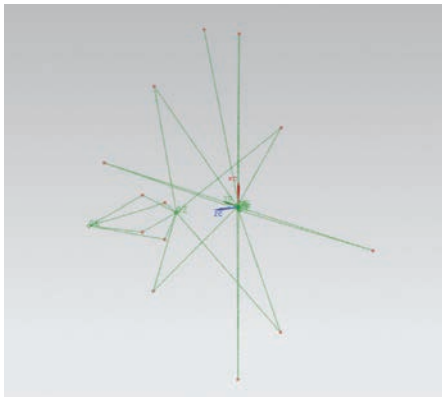
www.siemens.com/plm/nxnastran

NX Nastran – Superelements

Advantages of incremental processing
Instead of solving an entire finite element model each time, NX Nastran – Superelements offers the advantage of incremental processing of only one superelement at a time. And, if you make changes to your design in one place, only that superelement requires re-analysis. Automatic restarting is also available so only the operations necessary to incorporate changes are performed.

Superelements can also be used in collaborative design, as components of the model can be transferred (in superelement matrix form) from one company to another while enabling design details to remain hidden (only the stiffness terms are represented).





Antenna assembly reduced to a set of superelements.

Major capabilities
Powerful solution capabilities:

- Ability to use with all NX Nastran analysis capabilities
- Ability to combine models from different sources (internal and external)
- Single and multiple levels
- Global-local analyses
- Input and output partitioned by superelement
- Incremental solutions and partial assembly solutions
- Optionally select and scale stored loads within an external superelement
- Model foundations with boundary element method (BEM) based external superelements
- Differential stiffness support for external superelements

Superelements provide solution efficiency:

- Localized redesign requires only partial re-analysis
- Less computer time required per run, since only one superelement at a time need be processed
- Easier troubleshooting since each superelement is processed individually
- Faster nonlinear analysis runs because upstream superelements are linear
- Faster parametric (“what if...”) studies
- Ability to subdivide models that are too large to be analyzed all at once and analyze them in pieces instead
- Automatic restart – only the operations necessary to incorporate changes are performed
- Less risk per run – if an error occurs, only the affected part needs to be rerun

Siemens PLM Software
www.siemens.com/plm

Americas +1 314 264 8499
Europe +44 (0) 1276 413200
Asia-Pacific +852 2230 3308

© 2016 Siemens Product Lifecycle Management Software Inc. Siemens, the Siemens logo and SIMATIC IT are registered trademarks of Siemens AG. Camstar, D-Cubed, Femap, Fibersim, Geolus, GO PLM, I-deas, JT, NX, Omneo, Parasolid, Solid Edge, Syncrofit, Teamcenter and Tecnomatix are trademarks or registered trademarks of Siemens Product Lifecycle Management Software Inc. or its subsidiaries in the United States and in other countries. All other logos, trademarks, registered trademarks or service marks belong to their respective holders.
2652-A10 12/16 A