VNoise

Technical Details & Main Features

Computational core

- Frequency response with FEM
- Frequency response with direct and indirect BEM.
- Coupled FEM-BEM analyses.
- Acoustic cavity modes.
- Coupled structural-acoustic cavity modes.
- Fully coupled structural-acoustic analysis through the coupling with modal structural equations.
- Internal, external and mixed problems.
- Contribution Vectors for fast multi frequency radiation analysis (i.e. engine run up).
- Extremely complete set of boundary conditions, including pressure, velocity, and robin conditions, as well as free edges, radiation conditions, and baffled and un-baffled aperture, for openings simulation.
- Sound absorbing trims with acoustic impedance.
- Complex speed of sound and densities, for modelling bulk reacting materials.
- Different speed of sound and densities for different domains in the same calculation.
- User customizable coupling conditions at interfaces between different domains.
- Impedance and transfer matrix relations for black box modelling of filters and other acoustics elements.
- Modelling of perforated tubes and surfaces.
- Frequency interpolation for multi frequency analysis.
- Half space formulation, planar, and axial symmetries.
- Fully automatic, and extremely robust routine for CHIEF nodes.
- Isoparametric discretization of 1st and 2nd order.
- Monopole and dipole sound sources with user customizable frequency dependent intensity.
- User customizable sound source by direct import of pressure.
- Linear system solved using an iterative solver of the GMRES family that ensure great convergence speeds and stability.
- Direct Solver for small sized problems.
- Automatic use of out of core solver for big problems.
- Multiple load case analysis.
- Random Vibroacoustic analysis with evaluation of principal components response matrix (multiple load case analysis) from principal components PSD of excitation.
- Modeling of perforated surfaces.
- Fast Multi Domain for BEM internal analysis with increased speed and reduced memory requirements.

FWH Solver

- Sound radiated by aeroacoustic sources such as rotating blades, fans, and turbulence.
- Use unsteady pressure computed by CFD codes for the evaluation of radiated sound using an acoustic analogy based on the integration of the full FWH equations.
- Interface with CFD codes (Fluent).

User Interface

- PC Based (Windows XP/2000/NT).
- CAD and meshing features for modelling simple geometries.
- Full Interface with FEM/CAE tools including NASTRAN (bulk, f06, MSC op2, punch), ANSYS (rst), FEMAP, NEiNastran, Patran Neutral Files.
- Automatic features for converting FEM meshes into BEM meshes (Free edge and intersection detection, nodes disconnection, normal orientation check, hole closure, Volume elements skin detection, check for degenerated elements).
- Batch file for automating multiple operations and analysis.
- Easily programmable TAG based ASCII file format (VNoiseX) for automating import/export operations.
- Advanced import features for managing large FEM results files.
- Fully Automatic Mesh Coarsening based on an edge collapsing technique tailored for acoustic.
- Modal and velocity data projection with stable and accurate 3D interpolation and integration routines that permit to easily exchange data among different sources and discretizations.
- Simultaneous use of different models and analysis in background. The user can execute a calculation while he is executing pre-post processing operations with other models.
- Complete set of 2D and 3D plots and animations.
- Evaluation of Intensity, SPL, RMS, dBA, dBC, 1/3 octave, and specific functions for Transmission Loss and Insertion Loss.
- Transmission Loss of multi input - multi output systems.
- Sound Power evaluation from direct Intensity integration or from ISO procedures.
- Audio Replay capabilities for listening to the computed noise (wave files generation for further processing outside VNoise).
- Microphones arrays (Spherical, annular, planar).
- Structural forces and pressure distributions.
- Complete documentation and tutorials.
- On line technical support.

FEMAP/NeiNastran Interface

- Direct link that permits to exchange model and data with FEMAP/NeiNastran.
- Through FEMAP provide VNoise interface to the CAD tools supported by FEMAP (CATIA, Pro/Engineer, AutoDesk, SolidWorks and Solid Edge).

VNoise Cluster

- Distribute huge calculations across a simple PC network. No configuration needed.
- Impressive increase of computational power at a low software and hardware cost.