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SPECIFICATIONS



Software for Vibro-Acoustic Analysis of Noise Control Materials

Comet Acoustics® Overview

COMET Acoustics is a computer simulation software for solving sound and vibration problems. COMET offers advanced capabilities that make it the most comprehensive acoustic software available. COMET utilizes boundary and finite element methods as well as analytical techniques to accurately predict the propagation, radiation and transmission of acoustic waves in a variety of media including fluids, foams, and solids.

COMET allows systematic analysis and design improvement of acoustic products at the early stages of product development and as a result reduces the need to rely on costly physical prototypes. The ability to perform the analysis and design at the early state of design process enhances the quality of the product as well as reduces the time for the product to reach the market thereby reducing overall cost.

Comet Modules

- ◆ **BEAT:** Boundary element based technique for acoustic analysis of fluid and fluid-structure interactions
- ◆ **CAPE:** Graphical user interface based process for optimization of automotive interior noise
- ◆ **SAFE:** Finite element method for acoustic analysis of structures, elastic porous materials and fluids.
- ◆ **SoRT:** Integrated experimental/numerical technique for complex noise source identification
- ◆ **Trim:** Acoustic performance, inverse characterization and optimization analyses of noise control materials
- ◆ **Vision:** Graphical user interface for pre- and post-processing

Comet SAFE

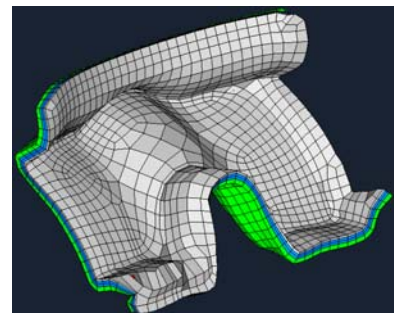
Structural Acoustic Foam Engineering

SAFE is a finite element based program that allows an overall approach to sound management by analyzing sound traveling through various media including fluids, solids, and foam-like substances. SAFE allows users to design optimal noise control treatments with such elastic porous materials as glass fiber, mineral wool, and a variety of cell foams. The development of SAFE was partially funded by the National Aeronautics & Space Administration (NASA).



Macroscopic Acoustic Properties of Elastic Porous Materials:

- Porosity
- Tortuosity
- Air flow resistivity
- Viscous characteristic length
- Thermal characteristic length
- Young's modulus
- Poisson's ratio
- Density
- Damping loss factor





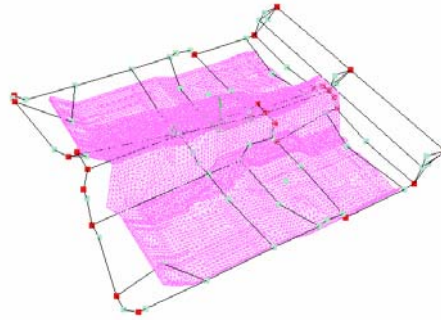
Analysis Types

- Frequency response analysis
- Acoustic eigenfrequency analysis
- Structural modal analysis
- Uncoupled acoustic analysis
- Coupled structural elastic porous acoustic analysis
 - Pure displacement-displacement formulation
 - Mixed pressure displacement formulation
- Static analysis for structures and elastic solids



Solution Methods

- Finite Element Method
 - Infinite elements for radiation analysis



Geometric Modeling Features

- Interior domain
- Exterior domain
 - Infinite elements
- Two dimensional domains
- Three dimensional domains
- Axi-symmetric domains



Special Features

- Two dimensional, three dimensional, axi-symmetric and generalized axi-symmetric analyses
- Automated nodal and elemental coupling between different domains
- Frequency dependent material properties
- Elastic porous materials formulation based on complete Biot's theory
- Comprehensive domain types
 - Fluid (acoustic) domain
 - Structural domain
 - Elastic solid domain
 - Elastic porous (elastic foam, rigid foam, limp foam) domain
- Correction for non-cylindrical pore shapes
- Extensive element library
 - Acoustic elements
 - Elastic solid elements
 - Plate elements
 - Elastic porous elements

Boundary Condition Types

- Acoustic boundary conditions
 - Pressure
 - Particle velocity
 - Impedance
- Structural boundary conditions
 - Displacement
 - Acceleration
 - Rotation
 - Force
 - Moment
- Randomly distributed load
- Frequency dependent boundary conditions

APPLICATION AREAS

- ◆ Aerospace
- ◆ Automotive
- ◆ Engine & Powertrain
- ◆ Consumer Products
- ◆ Audio/Electronics
- ◆ Acoustic Materials
- ◆ Computers & Peripherals
- ◆ Environmental Noise
- ◆ Exhaust Systems
- ◆ Heavy Equipment
- ◆ HVAC
- ◆ Recreational Vehicles
- ◆ Transducer Design
- ◆ Underwater Acoustics

Data Interfaces

- ◆ HyperMesh
- ◆ I-DEAS
- ◆ PATRAN
- ◆ ABAQUS
- ◆ ANSYS
- ◆ NASTRAN
- ◆ COSMOS
- ◆ STAR-CD
- ◆ B & K

Computer Platforms

- ◆ Windows XP
- ◆ Unix Workstations
 - HP
 - IBM
 - SGI
 - Sun

Comet Technology Corporation
 3830 Packard, Suite 110
 Ann Arbor, MI 48108
 Phone: (734) 973-1600
 E-mail: info@cometacoustics.com

Web: www.cometacoustics.com