Breakthrough Enhancement Provides Unparalleled Turbulent Flow Modeling for Vibro-Acoustic Simulation

ESI Group, a leading innovator in virtual prototyping software and services for manufacturing industries, announces the release of VA One 2016.VA One is the only full-frequency, single-environment simulation software available for solving a wide range of noise and vibration design challenges in automotive, aerospace, marine and industrial applications. VA One seamlessly combines finite elements, boundary elements and statistical energy analysis into one flexible modeling environment.

ESI VA One 2016 optimizes ongoing improvements in multicore processing to provide significant improvements in overall model runtime and overall performance speed, particularly in read, write, and solve steps. It also introduces unique capabilities for flexibly modeling complex loads and is able to robustly address the growing challenge faced by the automotive and aerospace industries to accurately predict wind and other noises due to turbulent flow effects. Excessive wind noise, which is generated by vehicles moving at high speed, is more than simply an acoustic annoyance to end users. Excessive wind noise negatively impacts phone calls and applications using voice recognition inside the vehicle. Reducing wind noise as much as possible is crucial to allowing optimal performance of various in-car communications.

Figure 1. Fluctuating surface pressures on side glass of car calculated using OpenFOAM®, open-source CFD code. Complex, fluctuating surface pressure data can be imported into VA One from nearly any commercial CFD code.

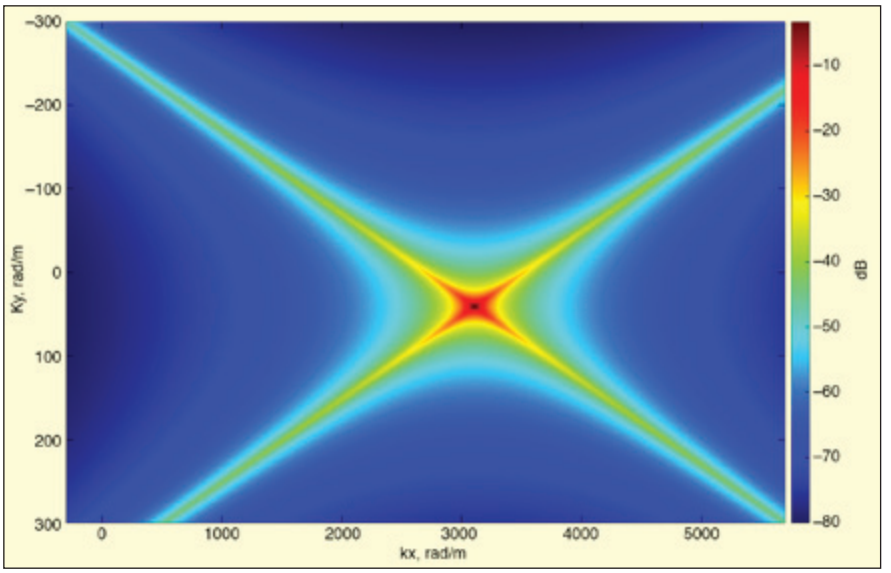

Figure 2. New, robust, easy-to-use tools in VA One AVA module allow data to be processed and convert pressures to a wave number-frequency spectrum, which can be applied as a load to the vibroacoustic model to predict interior wind noise.

Unique capabilities with VA One provides the ability to apply and visualize complex time-based aerodynamic loads to SEA (statistical energy analysis) vibro acoustic models to provide accurate noise predictions. Until now, SEA models excited by turbulent flow or other partially correlated sources were restricted to fitting analytical models – with consequent loss of important details of the loading. This left users the choice of accepting a loss of acoustic prediction accuracy or moving to more costly modeling approaches. The general surface pressure (GSP) enhancement in VA One 2016 removes this roadblock by allowing acoustic modelers to directly apply wavenumber spectra to SEA models. Taking advantage of the preprocessing capabilities of VA One, users can define the loads directly from CFD data or from their in house tools. Accurate design solutions can be obtained with minimal modeling and computational time.

Enhanced acoustic predictive capabilities for FE models with complex flow. VA One 2016 provides enhanced nonuniform acoustic FE mean flow predictive capabilities to accurately model the effect of flow on muffler transmission loss (TL) via automated OpenFOAM® analysis for reactive mufflers or when porous, sound-absorbing muffler materials such as fiberglass are present. The greater the muffler TL, the quieter the muffler and exhaust. The challenge is to model the complex, three-dimensional airflow in mufflers. This is addressed by VA One 2016, which provides a high-level, automated solution for taking into account the flow effect on muffler acoustics when complex geometries, perforated elements or porous materials are present.

Performance and productivity enhancements. VA One 2016 delivers a wide array of overall performance and speed improvements that specifically address the aerospace, automotive, marine and industrial markets. Improvements specifically address multi-core boundary-element method (BEM) calculations, and customers in automotive and related industrial markets will benefit from the new BEM improvements in radiated-noise calculations for modeling exterior noise generated, for example, by vehicle powertrains, consumer electronics, and industrial generators. Speed increases up to a factor of 50 have been achieved in certain complex BEM multicore calculations. This enhancement in calculation speed has also been particularly welcomed where users seek ongoing performance improvements to BEM modeling and support for calculation-intense stress failure predictions.

Aerospace and marine customers will benefit from improved SEA modelling of ribbed panels, such as used in lower hull sections for marine applications in the fuselages of aircraft.

For more information about ESI VA One, please visit www.esi-group.com/VAOne.