Vehicle exterior noise has to be reduced to satisfy a new pass-by noise regulation (ISO 362). An optimization of screening apertures, underbody and underhood absorption is therefore necessary, and numerical techniques must be able to predict the related sound reduction. Two theories have first been tested on straightforward benchmarks.

Neither EFA nor ASEA suits the establishment of a model of acoustic cavities which fulfil the optimization requirements such as damping localization. With ASEA the evolution of the energy levels depends on the mesh size. Techniques more representative of the physical problem are thus investigated.

**Candidate Method : Virtual SEA (VSEA)**

VSEA, initially conceived for vibratory calculation, turns out to be fitted to acoustic prediction. This technique allows the creation of a numerical energy based model of coupled acoustic cavities from the finite element global modes.