ACOUSTICS2008/500
An efficient distributed BEM solver for acoustic and vibroacoustic analyses on a standard PC network

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An efficient BEM approach that permit to solve large acoustic and vibroacoustic problems distributing analyses on a standard PC network is presented. The high efficiency is based on a mix of elements including:

1) A proprietary and high efficient communication and synchronization library (not MPI)

2) A Multi Domain Approach for reducing memory requirements and solution time

3) Efficient iterative solvers

The proprietary communication / synchronization library permits to take full advantage of recent multi core PC, enabling to set up clusters with a large number of computing units with a reduced number of PC. A "distributed memory" approach permit to have available the sum of all the PCs RAM, ensuring the possibility to solve large and huge problems that cannot be faced with standard approaches. The Multi Domain approach permit to further reduce the memory requirements, while preserving all the required flexibility in terms of boundary condition and coupling with structural modes.

Examples will be showed of large an huge analyses in different application fields including purely acoustics, and fully coupled structural-acoustic analyses.