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Comparison of numerical techniques for the vibro-acoustic behaviour of a flexible structure

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The tractors bonnets are large flexible parts that radiate noise under the excitation of the forces exerted on the contact points and the sound pressure fluctuations coming from the engine.

The vibro-acoustic behaviour of such a bonnet, excited by local forces or a diffuse pressure field, has been computed using various techniques: - In the low frequency domain, the finite element method has been used to compute the structural behaviour, while the acoustic radiation has been computed by using the boundary element method and the finite element method with approximated boundary conditions to simulate the free field conditions. - In the high frequency domain, the computation has been made using the SEA method, with an approximation of the radiation coefficients. -In the medium frequency domain, both techniques have been used and compared.

Software used where VA-One, from ESI, and Code-Aster, from EDF.

The paper presents the numerical results obtained, associated to the computing time. Approximated methods can be largely faster than 'exact' ones (finite elements associated with boundary elements) and, for engineering use, represent a good compromise between quality and efficiency.