

## **ACOUSTICS2008/1039 ONERA's activities on airframe noise numerical simulation**

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Airframe noise, or noise generated by flow around the airframe (high lift devices, landing gears and cavities), is a major contributor to the overall noise of large commercial aircraft in the approach phase. For several years, ONERA has been involved in the development of methodologies for the numerical simulation of airframe noise. These hybrid methods generally combine (i) CFD computations for the near field flow, including unsteady CFD techniques such as LES, DES and NLDE, and (ii) acoustic (CAA) propagation techniques in the mid- and far-field. A large range of acoustical methods is available for the propagation of sound waves in uniform or heterogeneous mean flows, either from the family of integral methods (Lighthill, FWH, BEM) or in the domain of (non-linear or linearized) Euler equations in perturbation. The key challenges of these hybrid methodologies are (i) the ad-hoc coupling between individual techniques and (ii) the availability of reliable and dedicated experimental database for the validation. The paper presents a survey of ONERA's activities in this field, with applications to (i) single symmetrical airfoil, (ii) high lift wing with deployed slat and flap, (iii) landing gears and (iv) cylindrical cavities.