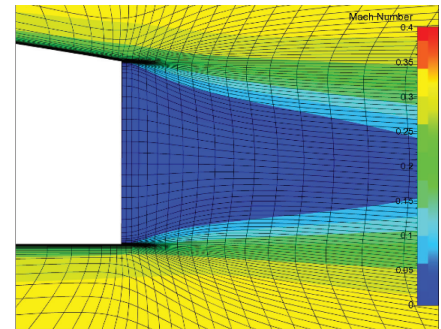


AEROACOUSTICS IN AIR AND GROUND TRANSPORTATION



The aeroacoustic activities carried out by the VKI spread over the EA, AR and TU departments, and are supported by a number of research contracts sponsored by the industry and the European Commission. Substantial research has been conducted for example in the field of ground transportation within the EC FP7 project ECOQUEST, where the acoustic nuisance caused by cooling units in automotive and locomotive applications is investigated theoretically, numerically and experimentally. In the aeronautics field, the VKI has investigated the potential benefits brought by plasma actuation and porous treatment applied to contra-rotating open rotors (CRORs) in the EC FP7 project DINNO-CROR. In the aerospace field as well, the VKI has been coordinating the EC FP7 project VALIANT, dedicated to the detailed experimental investigation and accurate numerical simulation of generic configurations representative of airframe noise.



Wake alteration past a blunt trailing edge by means of Dielectric Barrier Discharge attenuation

PLASMA ACTUATION AND POROUS TREATMENT OF CONTRA-ROTATING ROTOR BLADES

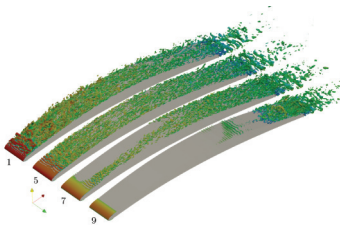
The noise emitted by blade-wake interaction is a concern in many applications including contra-rotating open rotors, which are nowadays a subject of intensive research. The research conducted by VKI is tackling the issue from two sides: the reduction of the intensity and shape of the wakes shed by the upstream rotor using plasma actuation, and the attenuation of the unsteady lift induced on the downstream rotor by means of porous treatment. The plasma actuation is based on the Dielectric Barrier Discharge technology.

VALIDATION AND IMPROVEMENT OF AIRFRAME NOISE PREDICTION TECHNIQUES

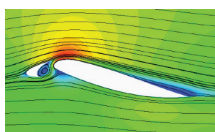
Within the EC FP7 VALIANT project coordinated by the VKI, intensive research is dedicated to the detailed measurement and accurate simulation of four generic configurations representative of high-lift devices and landing gear applications. Extensive databases have been generated, permitting an unambiguous validation of state-of-the-art aeroacoustic prediction techniques.

COOLING UNITS IN GROUND TRANSPORTATION

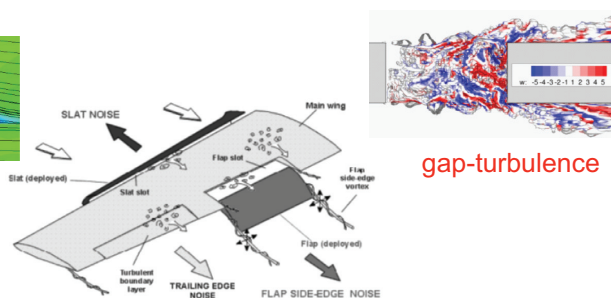
The noise emitted by cooling fans in automotive and locomotive applications is a serious issue for passenger comfort, both within the vehicle and for its environment. An accurate noise prediction requires a detailed knowledge of the flow field, which depends strongly on installation effects. Advanced numerical studies have permitted to quantify the uncertainty resulting from an inaccurate knowledge of the inflow conditions of a low-speed fan blade segment.



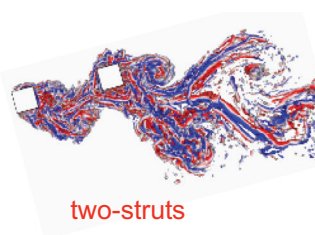
Uncertainty quantification for the aeroacoustic prediction of a cooling fan blade subjected to a varying angle of attack.



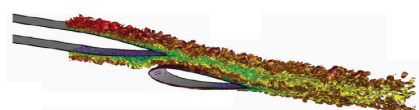
wing-slat



gap-turbulence



two-struts



wing-flap



Contact
Dr Christophe Schram
schram@vki.ac.be
Phone: +32 (0)2 359 96 15

