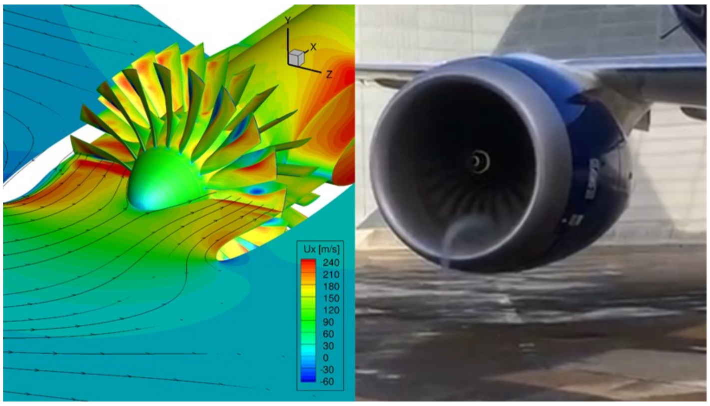
Master Thesis Project / Project Work

There is an urgent need to reduce the global greenhouse emissions due to aviation and bring it in line with the European Green Deal and the SRIA objectives. Current aircraft and engine designs are approaching their limit in efficiency and noise, and to achieve significant improvements new design concepts are required. One approach is to use higher bypass ratio and lower fan pressure ratio to improve specific fuel consumption, which results in fans with larger diameters. As the fan (and hence intake) diameter increases, shorter and slimer intakes are required to reduce the overall weight and drag of the aircraft. As a result of shorter intakes, the fan and the intake will become closely coupled and hence the effects of inlet distortions will become very important for the fan performance and stability .



Another way to improve propulsive efficiency is to move towards radical variations in aircraft architectures with Boundary Layer Ingesting propulsion systems, which would reduce the overall system's induced drag. Such novel propulsion system design (inlet and the fan) would be embedded in the back end of an aircraft's fuselage to ingest the slower boundary layer air flow, using it to generate the thrust needed to propel the aircraft through its mission. However, these new propulsor designs require a specialized inlet to help straighten out the swirling flow before it gets to the fan, and a more distortion tolerant fan able to work with increased levels of unsteady distortions introduced by the intake ducts.

The aim of project is analyse the performance and stability of aero-engines during crosswind and take-off conditions.

The work is carried out using CFD. This project is intended for students who are interested in fluid mechanics and aero-engines and have a strong background in numerical methods.

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