Shorter KTP Opportunity

Company name: Airbus

Location: Filton, Bristol

Title: Development of adjoint states for geometrical modelling routines.

Duration: 6 months

Preferred start date: ASAP.

Project description

The ultimate aim of the project is to achieve a fully adjoint optimisation capability for aerodynamics, which will allow the Airbus to estimate aerodynamic sensitivities up to 100 times faster than current methods. The proposed morphing approach is directed toward the parameterisation of the problem in curvature space, with constraints expressed in curvature, tangent and real space.

The geometrical modelling of the perturbations represents the first step (the parameterisation) of the whole process. Significant effort has already been spent on the flow solver and mesh movement capabilities. Many papers are available in the literature and some initial industrial application are also available.

The project will proceed through the use of NURBS and bump functions to deform surface geometry defining parts of an aircraft. Having used control points to displace the original NURBS surface, we will then generate the new NURBS surface such that it is compatible with being “morphed” back into the full original geometry description, obeying the boundary conditions specified during the extraction of the deformation geometry patch. We then generate the associated deformation field ready for introduction into the mesh movement. Finally, we will create the adjoint field for the deformation field with respect to the patch design variables.

The algorithms will be implemented in the Python language and will be used by our development team. The Associate will therefore work in close collaboration with the development team to ensure successful exploitation of the project outcomes.

Candidate profile:

The ideal candidate will be familiar with the NURBS formulation of 3D geometries, with a particular understanding of bump functions for use on NURBS surfaces/curves. He/She will have a strong background in control theory (possibly adjoint equations) and will also probably have a background in computational geometry. The candidate will also need to be proficient in Python, or willing and able to learn.