



DEPARTMENT OF AUTOMOTIVE AND AERONAUTICAL ENGINEERING

Aerodynamic Analysis with Athena Vortex Lattice (AVL)

Task for a Project at HAW Hamburg

Background

The Vortex Lattice Method (VLM) provides a quick understanding when induced drag is studied as a function of wing geometrical parameters. Previous studies in the research group AERO at HAW Hamburg used iDrag by Joel Grasmeyer and Tornado by Tomas Melin. The idea was to get also familiar with AVL and to comment on it. For this software test, some beneficial investigation had to be set up. Geometries had to be found that would look worthwhile for a little investigation. Two ideas were selected. 1.) The (theoretical) Oswald factor of a wing described only by its aspect ratio A and taper ratio λ should be calculated and compared with Hoerner's results. Hoerner's curve was regarded as fundamental and some check was on the agenda. 2.) The (theoretical) Oswald factor (related to Oswald factor of its reference wing) should be calculated for a box wing. The geometrical parameters of interest were the h/b -ratio and the decalage. This was seen as useful, because wind tunnel measurements were obtained previously that needed further evaluation and background understanding.

Task

Task is the evaluation of the AVL software by means of two example calculations. This includes the following subtasks:

- short literature review of the Vortex Lattice Method,
- description of AVL,
- comparison of the Oswald factor calculated with AVL for a simple wing described by its aspect ratio A and taper ratio λ with results from Hoerner,
- short literature review of box wing configurations,
- comparison of the Oswald factor (related to the Oswald factor of its reference wing) – as a function of h/b -ratio and decalage – with wind tunnel measurements.

The report has to be written based on German or international standards on report writing.