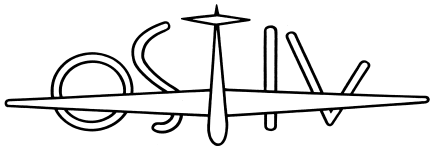

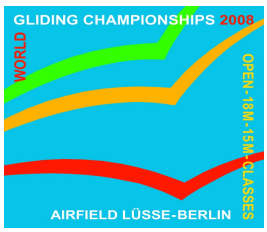

OSTIV Congress, Friday, 8 August 2008

The first paper of the second day was "Sailplane Wing-Fuselage Interaction: CFD, Wind-Tunnel and In-flight Testing," presented by Lukas Popelka. The lecture began with a discussion about how computational, wind-tunnel experiments, and flight testing have all been employed for the better understanding of sailplane aerodynamics. A number of cases in which turbulators were placed on wings for weaker laminar separation bubbles and, thereby, increase sailplane performance, as verified by flight testing, were discussed. The lecture then covered on-going work to explore wing-fuselage intersections. The presentation continued with a number of engaging flight-test results of a number of interesting aerodynamic phenomena using flow visualization techniques.

The next talk by JJ Bosman was also on wing-fuselage intersections and entitled, "CFD Transition Prediction on the JS 1 Wing/Fuselage Junction." This presentation began with an overview of how computational fluid dynamics (CFD) can be used to aid in the aerodynamic design of gliders. The use of the tool in exploring the aerodynamics of the wing/fuselage junction was then discussed, along with several two-dimensional validation exercises. Three-dimensional cases using the JS1 wing/fuselage juncture geometry were then presented, indicating that CFD has a great potential to benefit sailplane design efforts.

After the break, Johannes Hartmann gave a lecture entitled, "Passive Tip Blow-Out System for Yaw Control of a Sailplane." The idea of using a tip jet to provide yaw control for a sailplane was researched. In this idea, air flow is taken in on the inbound wingtip and blown out of the outboard one. A benchtop experiment was used to verify the concept and collect required design data. Calculation indicates that a tube with an equivalent diameter of roughly 8.0cm is required to compensate the adverse yaw of turning, although much remains to be done before this concept is fully practical.

Before the lunch break, Loek Boermans gave a presentation, in spite of heavy rain falling on the tin-roof of the briefing hangar, titled, "Improvement of Sailplane Climb Performance by Airfoil Design." The presentation began with a discussion of how airfoils that have a slight reduction in lift with an angle of attack prior to the maximum lift coefficient are problematic. In particular, negative vertical velocity gradients cause the sailplane climb rate to be significantly penalized. By designing airfoils without this behavior, a glider is much better able to negotiate random turbulent gusts that occur in typical thermals and have much improved climb performance.

After the lunch break, A. Gäbe gave his lecture, "Requirements to Servo-boosted Control Elements for Sailplanes." The talk began with the argument that some control problems with sailplanes, such as high air-brake control forces or control-rod deficiencies that result from the large wing deflections experienced by large-spanned sailplanes, could be improved with servo-boosted control elements. Handling qualities and flight dynamic data to aid in evaluation of the concept were obtained by means of flight test using a fully instrumented ASK-21.

In addition, actuator failure situations were simulated using numerical methods. A servo-boosted airbrake control was investigated experimentally, and it was found that reductions in control loads could be made practical. In cases of failure of one of the primary aerodynamic controls, compensation is often possible although some scenarios are catastrophic.

The next lecture, "Yaw-Free Multi-Probe for Soaring," was presented by L. Smolik. The presentation initiated with a summary of the principals of total-energy compensation and described how this has been accomplished in the past. Problems due to gusts and yawing were noted. To handle these deficiencies, a probe that aligns itself into the stream using yaw vanes was presented. Likewise, the geometrical configuration of the t-type probe itself was explored experimentally to determine the final design. The yaw-free probe is expected to improve the quality of the total energy measurement.

The next lecture prepared by Professor Antonio Dal Monte, "How to Improve Passive Safety in Gliders, Perhaps a Dream," was presented by Dr. J. Knüppel. Based on ideas derived from Formula 1 race car crashworthiness, a strong, break-away cockpit is proposed for use on gliders. By breaking away, the weight of the glider is not in a position to crush the cockpit area. Some model tests support these ideas, which could lead to much safer cockpit designs.

The final paper of the day, "EB-2, The FlyLab at the Warsaw University of Technology," was given by Miro Rodzewicz. The topic of airfoil design was discussed, and the role of wind-tunnel testing for experimental verification noted. After this justification, the wind-tunnels of Warsaw University were described, was then followed by the development for free-air testing techniques using a two-dimensional endplate system that is mounted on top of an automobile. This system was then mounted on top of a PW-6 sailplane. This system is able to measure lift and pitching moment by surface pressure distributions, and drag by means of wake surveys in realistic flight conditions. The FlyLab is now being used to support airfoil design efforts.