

**1993-1994**

**SMALL SCALE WIND TUNNEL INVESTIGATION OF  
F/A-18 AIRCRAFT AT HIGH ANGLES OF ATTACK**

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**Sponsor: NASA Ames Research Center**

**(Non-monetary support)**

**OBJECTIVE:** This was the continuation of the second project of a series of cooperative studies of F/A-18 between the Aero/Astro Department of the NPS and the Fixed-wing Aerodynamics Branch of NASA Ames Research Center aimed at studying the interaction between the F/A-18's LEX vortex and the vertical tail surfaces, with and without the LEX fences.

**SUMMARY:** The vortex wake data collected downstream of a 3% scale model of the YF-17 lightweight fighter prototype mounted at high angles of attack in the NPS low speed wind tunnel was examined to make appropriate recommendations to NASA in support of a full scale testing of F/A-18 in the NASA-Ames 80-ft x 120-ft wind tunnel. During the period under review (last year of the multi-year program), the earlier data from hot wire surveys and power spectra measurements (already reported in a M.S. Thesis) was further analyzed and a comprehensive report prepared and submitted to NASA Project Director, NFAC.F-18 High Alpha Test.

**HIGH-ALPHA LOW-SPEED AIRCRAFT AERODYNAMICS RESEARCH**

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**Sponsor: Naval Air Systems Command**

**Funding: Naval Postgraduate School**

**OBJECTIVE:** This is a multiyear program aimed at establishing a state-of-the-art research center for high angle-of-attack, low speed, steady/unsteady, aerodynamic studies at the Naval Postgraduate School.

**SUMMARY:** A low-speed experimental program on high-alpha, steady/unsteady aerodynamics was pursued in the low speed wind tunnel and the water tunnel of the Naval Postgraduate School, to carryout the investigations related to enhanced fighter maneuverability. During the period under review (last year of the multiyear program), the following major tasks were accomplished: (a) Flow visualization studies of a 2.3% canard-configured X-31A-like fighter aircraft model during sideslipping maneuvers. (b) Water tunnel studies of the X-31A-like model with an oscillating canard. (c) Fabrication of several double-delta wing models with different geometric modifications (fillets) at the kink. (d) Static and dynamic flow visualization studies of two double-delta wing models at high angles of attack.

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**Sponsor: NASA Ames Research Center**

**Funding: NASA Ames Research center (non-monetary support)**

**OBJECTIVE:** This is the continuation of the second project of a series of cooperative studies of F/A-18 between the Aero/Astro Department of the NPS and the Fixed-Wing Aerodynamics Branch of NASA Ames Research Center and is aimed at studying the interaction between the F/A-18's LEX Vortex and the vertical tail surfaces, with and without the LEX fences.

**SUMMARY:** A low speed investigation was conducted in the NPS wind tunnel to examine the vortex wake downstream of a 3% scale model of the YF-17 lightweight fighter prototype at high angles of attack. The study was in support of a full scale F/A-18 in the NASA-Ames 80-ft x 120-ft wind tunnel as part of NASA's High Alpha Technology Program. During the period under review, the earlier data from hot wire surveys and power spectra measurements (already reported in a M.S. Thesis) was further analyzed and the trends compared with similar work done elsewhere. A comprehensive report was prepared and submitted to NASA Project Director, NFAC F-18 High Alpha Test.