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Summary Report: VKI Lecture MOO Methods for Multidisciplinary Design and UCAV Systems Applications

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ABSTRACT

These lecture notes highlight some of the recent applications of multi-objective and multidisciplinary design optimisation in aeronautical design using the framework and methodology described in References 1, 2. A summary of the methodology is described and several test cases dealing with detailed design and computed with the software are presented and results discussed.

Results show;

1. The overall framework and MDO problem is illustrated in figure 1.
2. Figure 2 shows the results of a Two Dimensional Two Objective Aircraft High Lift System Design and Optimisation, the figure shows a well distributed Pareto front and the capabilities of the framework to solve inverse problems
3. Figures 3 a) and b) show the results (*Mach* sweep) for a UAV Wing Aerofoil Section Design Optimisation with Uncertainty design technique. The uncertainty based designs (Aero-Uncertainty) produce not only lower drag coefficient and sensitivity but also have higher aerodynamic performance and stability along the Mach sweep.

REFERENCES

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[2] D.S. Lee**,** L.F. Gonzalez, K. Srinivas and J. Periaux. Multi-objective Robust Design Optimisation of Transonic Civil Transport using an Evolutionary Approach with Uncertainty, 7th World Congress on Structural and Multidisciplinary Optimisation, COEX, Seoul, Korea. 21 - 25 May 2007.

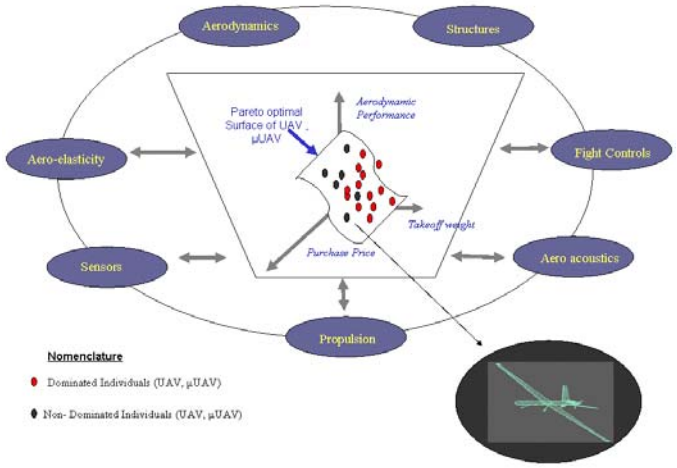

Figure 1: UAV/UCAV MDO.

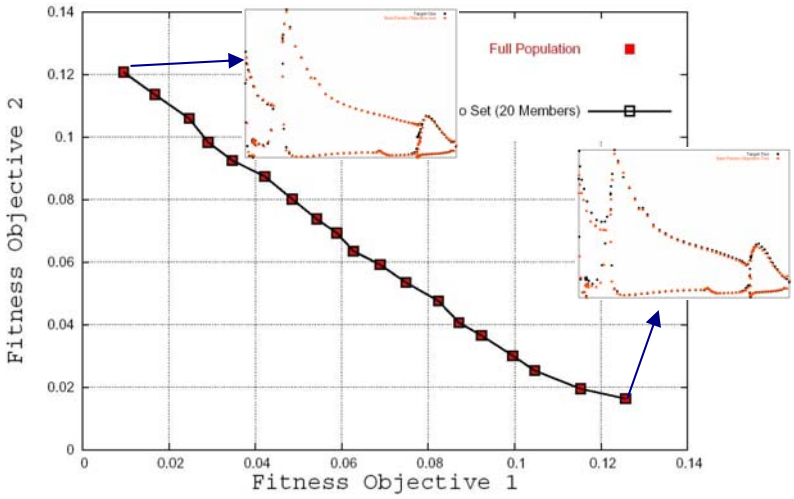

Figure 2: Pareto Front High Lift system design.

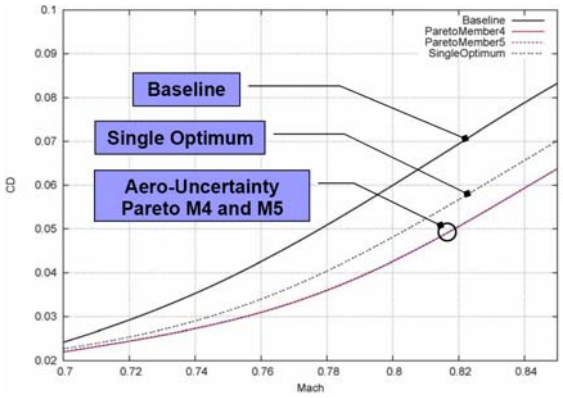

Figure 3 a): C_D vs. *Mach*.

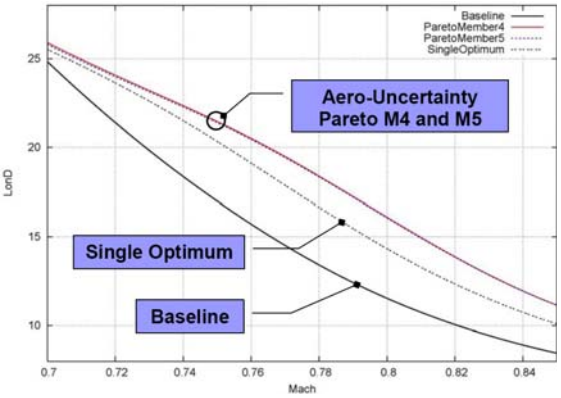

Figure 3 b): *L/D* vs. *Mach*.