

**AERODYNAMICS PREDICTION OF MULTI-PURPOSE UAV USING  
WIND TUNNEL EXPERIMENTAL APPROACH**



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**JULAI 2009**

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Thank you

# CHAPTER ONE

## INTRODUCTION

### 1.0 Aerodynamic

Aerodynamics is a branch of dynamics concerned with the study of fluid flow and the interaction of the atmosphere around the objects. The calculation of important performance indicator such as forces and moments acting on an object can be made with the deep understanding of the motion of air around an object.

In aviation, aerodynamic is one of the most important fields to consider when designing a new or modifying the existing airplane. The collections of aerodynamic database, for example lift, drag and moments force will help the designers and aeronautical engineers to improve the aerodynamic design and the performance of the airplane. Since the first airplane has been developed, the design and performance of the airplane is getting better. Many years of studies in aerodynamics leads people to find a way and solutions on how to makes airplane or any flying object to get the maximum capability in speed, performance, ability in any maneuvering and prediction of forces and moment.

Aerodynamics investigation and analysis can be classified according to the ratio of the problem's characteristics flow speed to the speed of sound. Subsonic is a second classification of aerodynamics which all the speed in the problem are less than the speed of sound.

At present, the design of unmanned aircraft vehicle,UAV is one of the most challenging tasks in aerodynamic studies. In UAV design, the placement of the wing, tail and canard is somehow, not the same as in the conventional airplane configuration. There are a lot of UAV designs such as peanut shape (Canadair CL-227 Sentinel), VTOL UAV with counter-rotating blades and variation of shapes in the planform wings and tails. These configurations need a lot of aerodynamic skills and knowledge to ensure that the UAVs can safely take off, loiter and land.

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