

## Low speed and high altitude flights

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The Low speed and high altitude flights and UAV applications have gained interest in the last two decades. This has led to an increase in studying flows in transitional regime. One of the dominant phenomena observed and not yet controlled is the formation and detachment of the laminar separation bubble (LSB) on a lifting surface. Its consequences on aerodynamic characteristics are yet to be understood. Many research studies are aimed at documenting the process of formation and detachment of the laminar separation bubble in well-controlled 2D flows. Their objective is to determine the signature of the LSB on physical parameters such as wall shear stress, aerodynamic forces and also on low frequency noise generation. Being able to detect this phenomenon opens up a large spectrum of possibilities in flow control techniques for such flow conditions and for UAV applications. At RMC, we are conducting an experimental study using different airfoils subjected to a low turbulence intensity flow and where the Reynolds number is between  $5.0 \times 10^4$  and  $1.2 \times 10^5$ . Shear stress measurements in the boundary layer and velocity measurements in the airfoil wake are performed simultaneously. Different applications are targeted. In the case of an airfoil free to move in pitch and plunge, the focus is on strategies to harness the energy transferred to the airfoil to be used as a wind conversion energy system. For the case of a rigid airfoil, our goal is to determine the consequence of the laminar separation bubble on instantaneous forces on the airfoil to improve the design of UAVs and wind turbines blades.

### Biography

A. Benaissa completed his Ph.D. at IMST (Marseille- France) in 1993 after spending 3 years working on the linkage between a passive scalar and its dissipation in a turbulent boundary layer with and without suction. After a Post-Doc position spent at Queen's University in Kingston Ontario, he joined the Royal Military College of Canada in 1998 as a research fellow and became member of the faculty of Mechanical Engineering department in 1999. He serves as member of the editorial board of the Journal of Aeronautical and Aerospace Engineering.

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