Investigating flow stability, turbulence and flow control using PIV

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This paper describes a number of studies on flow stability, turbulence and flow control undertaken in Australia and beyond by the author, his students and colleagues and how some of these studies lead to number of PIV analysis developments such as the iterative adaptive cross-correlation PIV analysis that has become known as Multigrid PIV analysis\textsuperscript{1, 2, 3}.

The flow stability and control studies have been predominantly associated with separated flow from circular cylinders, blunt flat plates and NACA type airfoils. Closely associated with the control of separated flow is the flow physics of oscillatory jet actuators, known as zero-net-mass flux jets or more precisely, zero-net-mass flux jets in cross-flow. Studies of these jets will be reviewed.

The study of the structure of turbulence has focussed on turbulent free shear flows and wall-bounded turbulence. The different variants of PIV methodology which have been used to investigate these flows include 2C-2D PIV, 3C-2D stereo PIV (SPIV) and 3C-3D tomographic PIV (Tomo-PIV). Pertinent PIV measurement results of these turbulent flows will be highlighted and the structure of these flows deduced from these measurements will be briefly discussed.

