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Experimental study of the flow over a backward-facing rounded ramp THOMAS DURIEZ, JEAN-LUC AIDER, JOSE EDUARDO WESFREID, Laboratoire PMMH UMR 7636 CNRS ESPCI Paristech - Université Pierre et Marie Curie - Université Paris.Diderot, INSTABILITY CONTROL AND TURBULENCE TEAM — The backward-facing rounded ramp (BFR) is a very simple geometry leading to boundary layer separation, close to the backward facing step (BFS) flow. The main difference with the BFS flow is that the separation location depends on the incoming flow while it is fixed to the step edge for the BFS flow. Despite the simplicity of the geometry, the flow is complex and the transition process still has to be investigated. In this study we investigate the BFR flow using time-resolved PIV. For Reynolds number ranging between 300 and 12 000 we first study the time averaged properties such as the positions of the separation and reattachment, the recirculation length and the shear layer thickness. The time resolution also gives access to the characteristic frequencies of the time-dependant flow. An appropriate Fourier filtering of the flow field, around each frequency peak in the global spectrum, allows an investigation of each mode in order to extract its wavelength, phase velocity, and spatial distribution. We then sort the spectral content and relate the main frequencies to the most amplified Kelvin-Helmholtz instability mode and its harmonics, the vortex pairing, the low frequency recirculation bubble oscillation and the interactions between all these phenomena.

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