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Experimental investigation of the flow over periodic hills CHRISTIAN CIERPKA, SVEN SCHARNOWSKI, MATTHIAS EHLERT, Bundeswehr University Munich, MICHAEL MANHART, Technical University Munich, CHRISTIAN J. KÄHLER, Bundeswehr University Munich — The flow over periodic hills is a common geometry for the validation of numerical flow simulations and an ERCOFTAC test case (Nr. 81). The numerical prediction is quite difficult, since flow separation and reattachment are not fixed in space and time due to the smooth geometry (Fröhlich et al., J Fluid Mech 526, 2005). Furthermore, the separated and fully three-dimensional flow from the previous hill impinges the next hill and results in very complex flow features including turbulent splashing, Taylor-Görtler vortices and a very thin shear layer with developing Kelvin-Helmholtz instabilities (Rapp, Manhart, Exp Fluids 51, 2011). To examine the characteristics of the flow features even close to the wall an experimental PIV investigation with up to single pixel resolution was performed at the existing experimental facility at the TU Munich. To further enhance spatial resolution and measurement precision also advanced particle tracking methods were applied to evaluate the data. The dynamics of the flow features was measured by using time-resolved sampling of the flow. The analysis of the data shows that all relevant scales can be resolved. Therefore a better data set for the validation of numerical simulation is now available.

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