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Experimental investigation of hydraulically different surface roughnesses

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ABSTRACT

Surface roughnesses present hydraulic differences that can be characterised investigating time averaged velocity profiles, turbulence, Reynolds and form induced stresses. The latter, unlike the other flow characteristics, have not been considered in detail in previous studies. An experimental study of the turbulent flow over five different surface roughnesses is presented. They have been constructed with natural and artificial materials, and with different geometries. The experiments were carried out in a laboratory flume and the 3D flow field has been measured with a Nortek Vectrino Profiler. The double averaged Navier-Stokes equations methodology has been applied to study the spatial heterogeneity of the time averaged flow. The results confirm the studies made in previous works with different surface roughnesses and the form induced stresses reveal the hydraulic differences and similarities for the different investigated roughnesses.