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Turbulent length scales and anisotropy over a protruded gravel bed

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ABSTRACT

The experimental study focuses on the variations of turbulent length scales and anisotropy in a wall-wake flow downstream of a sphere placed on a gravel bed. The results reveal that in presence of the sphere, Prandtl's mixing length increases near the bed and then decreases in the upper half of the sphere. On the other hand, Kolmogorov length scale and Taylor microscale decrease at the downstream of the sphere. The peak defects of the scales are observed at the immediate downstream. In presence of the sphere, the streamwise, spanwise and vertical components of anisotropy are less, more and invariant, respectively, as compared to their upstream values. However, as the downstream distance increases, the changes gradually reduce and finally disappear at a far downstream, recovering the profiles as in a hydraulically rough flow.