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Dynamics of Barchan dunes in a turbulent boundary layer FRANCOIS CHARRU, ERICK FRANKLIN, Universite Toulouse III, IMFT, IMFT TEAM — When a fluid flow transports a small amount of solid heavy particles on a non-erodible ground, particles form isolated dunes which slowly propagate downstream. Such dunes have been studied experimentally in a channel. Strikingly, particle heaps always form dunes with crescentic shape, similar to that of Barchan dunes in deserts at a much larger scale. Varying the fluid flow and particle properties, it was found that the dune velocity scales as $V \sim 1/L$ where L is the dune length, as expected, but does not follow Bagnold's prediction $V \sim u_*^3$ where u_* is the friction velocity; some dependence on the particle Reynolds number, and perhaps relaxation effects in the particle flux on the dune surface, have to be considered. PIV measurements show that the fluid velocity does not increase on the lee side of the dune, as predicted by Hunt and co-workers, but slightly decreases because of the sudden increase of roughness. The roughness change also appears to be of particular importance for understanding the variation of the turbulent stresses $-\rho\overline{u'v'}$ along the dune.

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