Abstract Submitted
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Turbulent flow past an obstacle embedded in a hydraulically rough and porous bed[1] NIKOLAOS APSILIDIS, Virginia Tech, PANAYIOTIS DIPLAS, Lehigh University, CLINTON DANCEY, PAVLOS VLACHOS, POLYDEFKIS BOURATSIS, Virginia Tech — The pressure gradients imposed by wall-mounted obstacles give rise to large-scale, coherent flow structures. Past studies have linked the unsteadiness of these organized flow motions to phenomena such as increased turbulence intensities, momentum and heat transfer over the junction region [Simpson, *Annu. Rev. Fluid Mech.* 2001]. The typical configuration under study refers to a bluff body mounted vertically on an impermeable and hydraulically smooth wall. These characteristics of the bottom boundary, however, do not model accurately a number of flows of environmental (river flow around a boulder) or engineering interest (flow past a bridge pier). Motivated by this inconsistency, we carried out experiments for the turbulent flow at the upstream junction of a cylinder placed within a permeable, hydraulically rough bed. Using 2D2C Particle Image Velocimetry, we captured the rich dynamics of the coherent flow structures developing over the region of interest. We compared results with those from a benchmark test run at a similar Reynolds number, but over a smooth and impermeable bed. Comparisons show that the unsteadiness of coherent flow structures at a wall-body junction increases significantly in the presence of a permeable and rough wall.

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Nikolaos Apsilidis
Virginia Tech

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