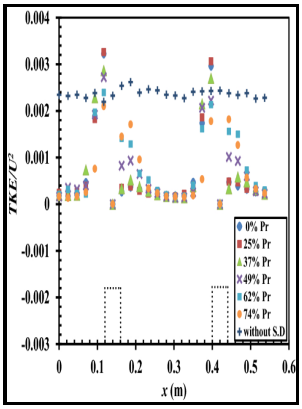
Interaction between turbulent flow and undular permeable boundaries

Dept. of Civil Engineering, Massachusetts Institute of Technology - Transport of Turbulence Across Permeable Interface in a Turbulent Channel Flow: Interface



Description: -
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Turbulence.
Hydraulics.Interaction between turbulent flow and undular permeable boundaries
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Recherches et travaux (Universite Stendhal-Grenoble 3. U.F.R. de lettres)
Recherches & travaux
Report (Ralph M. Parsons Laboratory for Water Resources and Hydrodynamics) -- no. 180.
Ralph M. Parsons Laboratory for Water Resources and Hydrodynamics. Report -- no. 180.Interaction between turbulent flow and undular permeable boundaries
Notes: Bibliography: p. 167-169.
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14.7 Viscosity and Turbulence

Linear analysis suggests that the condition for the onset of BLS can be related to a nondimensional wave forcing index—a normalized ratio of the wave-induced vertical motion above the BL to the mean wind speed near the surface. Specifically, the lower branch of a BLS-related rotor circulation is toward the terrain, and the lower branch of a wave breaking—induced rotor circulation is away from the terrain.

CFD Analysis for Turbulent Flow within and over a Permeable Bed

The variation of the pressure distribution over the surface of the cylinder manifests as an oscillatory drag force, which is the source of flow-induced vibrations in structures. The patterns of the turbulent diffusion term T 3rd row of Fig.

Bed forms in turbulent channel flow

Details of the time-averaged and instantaneous flow are revealed using various visualisation methods. For N R N R above about 3000, flow is turbulent. The simulation results include mean velocities and various turbulence quantities turbulent kinetic energy TKE , turbulent shear stress, TKE production and dissipation.

ShieldSquare

In addition, as will be shown in the next section, a linear hydrostatic wave cannot directly induce leeside BLS regardless of its wave amplitude.

ShieldSquare

The introduction causes the excitation of a wave and an increase in the Reynolds stress which in turn increases the total stress.

14.7 Viscosity and Turbulence

Within the K- epsilon model there are a three solution models available Standard, RNG, and Releasable models. The smallest eddies then lose energy through the action of viscous dissipation rate, which finally convert into thermal energy. Turbulent flow is always rotational and three dimensional.

Turbulent flow over an array of boulders placed on a rough, permeable bed

Just as the Reynolds number characterizes the flow regime, oscillatory flows are described by the Strouhal number: where τ is the period of oscillation.

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A system is defined to be chaotic when its behavior is so sensitive to some factor that it is extremely difficult to predict.

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