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Turbulent flow characteristics over anisotropic porous media. KAZUHIKO SUGA, UNDE HO, SEITARO NAKAMURA, MASAYUKI KANEDA, Osaka Prefecture Univ — Planar PIV measurements of turbulence over anisotropic porous media are carried out. Three kinds of anisotropic porous media are considered to form a bottom wall of fully developed turbulent channel flows. Their wall normal component of the permeability is larger than the other components by the factor of 1.3-170. The range of the measured Reynolds number is Reb=1300-13000. It is found that the streamwise component significantly more affects the turbulent flow characteristics than the other components. It is considered that the streamwise permeability controls the strength of traveling waves over the porous surface which are originated by the Kelvin-Helmholtz instability and drive transverse roll vortices. Considering the present data and our previous data of isotropic porous wall flows, an effective permeability Reynolds number that is a parameter to characterize the turbulence over porous walls is proposed. This effective permeability Reynolds number is a tensorially consistent expression including both streamwise and wall normal components of the permeability. It is shown that the zero-plane displacement, equivalent roughness height and Karman constant variations of mean velocity profiles well correlate with the effective permeability Reynolds number.

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