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Effect of seabed roughness on tidal current turbines[1] VIKRANT GUPTA, MINPING WAN, Southern University of Science and Technology China — Tidal current turbines are shown to have potential to generate clean energy for a negligible environmental impact. These devices, however, operate in high to moderate current regions where the flow is highly turbulent. It has been shown in flume tank experiments at IFREMER in Boulogne-Sur-Mer (France) and NAFL in the University of Minnesota (US) that the level of turbulence and boundary layer profile affect a turbines power output and wake characteristics. A major factor that determines these marine flow characteristics is the seabed roughness. Experiments, however, cannot simulate the high Reynolds number conditions of real marine flows. For that, we rely on numerical simulations. High accuracy numerical methods, such as DNS, of wall-bounded flows are very expensive, where the number of grid-points needed to resolve the flowvaries as $(Re)^{9/4}$ (where Re is the flow Reynolds number). While numerically affordable RANS methods compromise on accuracy. Wall-modelled LES methods,whichprovide both accuracy and affordability, have been improved tremendously in the recent years. We discuss the application of such numerical methods for studying the effect of seabed roughness on marine flow features and their impact on turbine power output and wake characteristics.

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