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Experimental Investigation of Kinetic Energy Transport around a Yawed Tidal Stream Turbine[1] PRANAV K. MODALI, ASHWIN VINOD, ARINDAM BANERJEE, Lehigh Univ — Tidal Stream Turbines (TST) experience yawed inflows that have a considerable impact on their operational efficiency and wake propagation. We present detailed near-wake measurements using an Acoustic Doppler Velocimetry for a 1:20 scale TST model (three-bladed, constant chord, zero twist) in a uniform inflow at yaw angles of 15and 30. The results are compared with the baseline no-yaw case. Wake data is collected at hub height up to a downstream location of 4D. The near-wake region is analyzed from the perspective of terms constituting the streamwise momentum and turbulence kinetic energy (TKE) equations in order to better characterize the physical mechanism behind the asymmetric wake due to the yawed inflow. Momentum budget terms elaborate on various factors helping in momentum recovery in the wake. Turbulence kinetic energy (TKE) budget details the relative contribution of physical processes dictating different motions of the turbulent flow that assist in the re-distribution and dissipated of the TKE generated in the shear-layer region.

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