National Institute of Technology Rourkela

Synopsis Seminar

Seminar Title	: Experimental and Numerical Investigations of Velocity Profiles for Unsteady Open Channel Flow
Speaker	: Sarjati Sahoo (Rollno : 518ce1009)
Supervisor	: Prof. Kishanjit Kumar Khatua
Venue	: Civil Engineering Departmental Seminar hall
Date and Time	: 09 Apr 2024 (04.30 PM)
Abstract	: Understanding unsteady open channel flow is vital for various engineering applications. Analysis of experimental longitudinal velocity profiles, lateral depth averaged profiles for two distinct hydrographs have been performed at Hydraulic Engineering Laboratory (CE Department) of NIT Rourkela. For each hydrograph, the velocity profiles for any particular depths of flow that may happen at any instant of the hydrographs have been studied. A comparative study has been made for both steady and unsteady flow conditions. The experimental results have also been compared with the different standard numerical models obtained from both the ANSYS and Open Foam CFD Software. For steady flow conditions, the SST *k-&omega* model demonstrated superior accuracy in forecasting longitudinal velocity profiles at all vertical positions within the grass bed channel when compared to the other seven simulated turbulence models. The difference between velocities of numerical and experiment results in rising limb is found to be more than that of the falling limb cases for all sections in both the flow depths studied. This difference of values of results are found to increases more towards the wall. A mathematical model to predict velocity profiles in simple channels under steady flow condition is developed. Mathematical models are also proposed to predict velocity profiles of an unsteady open channel flow for any particular flow depths of a unsteady channel flow that may happen for both rising and falling limb of the hydrographs. The models are found to provide a reasonable accuracy as compared to the observed data sets and experimental data sets of other researchers. The findings contribute valuable knowledge for engineering applications and further research in fluid mechanics.