National Institute of Technology Rourkela

Registration Seminar

Seminar Title	: INVESTIGATING THE FLOW DYNAMICS AT A RIVER CONFLUENCE
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Venue	: Civil Engineering Department Seminar Hall
Date and Time	: 30 Jan 2025 (11:30 AM)
Abstract	: River confluences are dynamic zones critical for sediment transport, ecological balance, and hydrodynamic interactions, yet they pose significant challenges in understanding energy dissipation and flow dynamics. This study focuses on the confluence of the Tel and Mahanadi rivers, exploring flow patterns, turbulence, and energy losses through a combination of numerical modelling, physical experiments, and field data collection. Employing Computational Fluid Dynamics (CFD) tools like ANSYS Fluent or FLOW 3D Hydro, along with experimental flume setups and real-world velocity measurements, the research integrates methodologies to analyse turbulence intensities, vorticity, and sediment interactions. The results underscore the role of confluence angle, discharge ratios, and bed morphology in shaping flow structures, including secondary currents and shear layers. Simulations with turbulence models&mdashRSM, LES, and DES&mdashreveal distinctive patterns in velocity recovery, wake formation, and turbulence dissipation. These findings, validated against physical and field data, can offer insights into mitigating erosion and optimizing hydraulic structures. Despite advances in modelling and analysis, gaps remain in understanding large river systems with significant morphological variability. This study highlights the necessity of integrating advanced numerical tools with field and physical experiments for a comprehensive understanding of confluence hydrodynamics, contributing to improved water resources management.

Key words: River confluence, Velocity, Roughness, Numerical simulation, Energy dissipation