



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS



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Programme of Study : Ph.D.

Thesis Title: **Influence of Green Corridor and Bridge Piers on River turbulence by Experimental and Numerical investigation**

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Thesis Submitted to the Department/ Center : Centre for the Environment

Date of completion of Thesis Viva-Voce Exam : 12/11/2021

Key words for description of Thesis Work : Sinuous channel, Green Corridor, Turbulent Structures, Flow3D Model

SHORT ABSTRACT

Most of the Indian peninsular rivers are generally low sinuous rivers. The three-dimensional flow structures in curved channels control the hydrodynamic and morphological adjustments of the river system. In addition, physio-hydrological characteristics of the river, engineering interventions and river corridor vegetation alter the flow structure in these rivers.

In this thesis, to study the hydraulic behavior of the low sinuous river by quantifying the turbulence parameters such as turbulence intensity, Reynold's stress and turbulent kinetic energy. Further, the impact of floodplain vegetation on flow structure into the mainstream and the variability of velocity profiles under different flow conditions and vegetation densities has been studied. These findings provide better understanding of turbulence and altering of velocity distribution. The understanding of flow and floodplain vegetation interaction is extended to study the hydrodynamic response of the sinuous river subjected to combined effect of bridge piers and vegetation cover over the floodplain. In this research, an inter-comparison study is carried out between numerical model simulations and experimental results for evaluating the performance of CFD model in predicting the hydrodynamics structure with the influence of flood-plain vegetation in the sinuous channel. For this study, vegetation cover and bridge piers are incorporated in the FLOW3D CFD model, and hydrodynamic simulations are carried out for the turbulence characteristics.

The study of vegetation- bridge pier-flow response can be extended further by monitoring the process at field scale for river corridor management. The present thesis work provides a comprehensive understanding on the effect of floodplain vegetation of various scenarios on main channel turbulent characteristics of sinuous rivers.