**Two-Dimensional Analysis of Flow Field and Associated Scour Parameters at Downstream of Weir with and without Sloping Apron**

**R. Karthik1, U. Kumar2, and A.K. Barbhuiya3**

1Research Scholar, Civil Engineering Department, NIT Silchar

2Associate Professor, Civil Engineering Department, NIT Silchar

3Professor, Civil Engineering Department, NIT Silchar

**Corresponding author:** R. Karthik, Email: civilkarthik2010@gmail.com

**Abstract**

The downstream scour of the control structure is more common and very complex issue in the river engineering now-a-days. Flow-features in the vicinity of control structure are quite different from other parts of the river. In order to visualise the flow features precisely in the vicinity of the control structure, the combination of Multiphase Eulerian model (Ansys 17 Fluent) and hybrid Dense Discrete Phase Model (DDPM) is primarily employed in the present research work. These models provide better visualisation of the flow structure and its associated scour development both in the upstream as well as in the downstream direction. Here initially, the model simulation is performed with trapezoidal weir and trapezoidal weir with sloping apron platforms and then comparison is made between the flow -structure and their associated scour. The erosion is computed by Mc Laury erosion model and particle tracking is done using DDPM through a Lagrangian approach which helps in stimulating the movement of the particles within flow domain, as well as the velocity and other properties. Besides this, sediment particle tracking is also shown in the above-mentioned research work. The obtained results show that the velocity of the flow reaches around 0.835 ms -1 using trapezoidal weir. However, as in case of trapezoidal weir with sloping apron, the maximum velocity goes approximately 0.505 ms-1 which is almost equal to inlet velocity. Hence, sloping apron plays a significant role in protecting the downstream side of control structure.

Key words: CFD, Mc Laury erosion model, K- ε Turbulence model, DDPM, Eulerian approach, Fluent