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# Three-Dimensional CFD Modeling of Flow Field and Scouring around Bridge Piers

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**Abstract :** In recent years, sediment scour near bridge piers and abutment is a serious problem which causes nationwide concern because it has resulted in more bridge failures than other causes. Scour is the formation of scour hole around the structure mounted on and embedded in erodible channel bed due to the erosion of soil by flowing water. The formation of scour hole around the structures depends upon shape and size of the pier, depth of flow as well as angle of attack of flow and sediment characteristics. The flow characteristics around these structures change due to man-made obstruction in the natural flow path which changes the kinetic energy of the flow around these structures. Excessive scour affects the stability of the foundation of the structure by the removal of the bed material. The accurate estimation of scour depth around bridge pier is very difficult. The foundation of bridge piers have to be taken deeper and to provide sufficient anchorage length required for stability of the foundation. In this study, computational model simulations using a 3D Computational Fluid Dynamics (CFD) model were conducted to examine the mechanism of scour around a cylindrical pier. Subsequently, the flow characteristics around these structures are presented for different flow conditions. Mechanism of scouring phenomenon, the formation of vortex and its consequent effect is discussed for a straight channel. Effort was made towards estimation of scour depth around bridge piers under different flow conditions.

**Keywords :** bridge pier, computational fluid dynamics, multigrid, pier shape, scour
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