

Abstract Submitted
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Coherent Structure Dynamics of the Horse Vortex System Induced by a Circular Cylindrical Pier Mounted on a Flat Plate at $Re=39,000$ CRISTIAN ESCAURIAZA, Georgia Institute of Technology, JOONGCHEOL PAIK, FOTIS SOTIROPOULOS — A critical prerequisite for developing predictive computational models of sediment transport and scour in real-life bridge foundations is the numerical simulation of the foundation induced large-scale, coherent vortices at full-scale Reynolds numbers. We simulate the turbulent flow past a single cylindrical pier mounted on a smooth flat bed using an overset grid approach in conjunction with a coherent structure resolving statistical turbulence model; Spalarts Detached Eddy Simulation (DES) approach (Spalart et al. in *Advance in DNS/LES*, 1997). The computed results are compared with Dargahis (*Experiments in Fluids*, Vol. 8, p. 1, 1989) flow visualizations and mean flow measurements in the geometrical configuration, and analyzed to elucidate the rich physics of the flow in the upstream region of the cylinder, which is dominated by the low frequency unsteadiness of the horseshoe vortex system. The interaction of the HV system with the cylinder wake is also examined in detail.

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