Numerical investigation of flow and scour around a vertical circular cylinder - DTU Orbit (23/12/2018)

**Numerical investigation of flow and scour around a vertical circular cylinder**

Flow and scour around a vertical cylinder exposed to current are investigated by using a three-dimensional numerical model based on incompressible Reynolds-averaged Navier–Stokes equations. The model incorporates (i) k-ω turbulence closure, (ii) vortex shedding processes, (iii) sediment transport (both bed and suspended load), as well as (iv) bed morphology. The influence of vortex shedding and suspended load on the scour are specifically investigated. For the selected geometry and flow conditions, it is found that the equilibrium scour depth is decreased by 50% when the suspended sediment transport is not accounted for. Alternatively, the effects of vortex shedding are found to be limited to the very early stage of the scour process. Flow features such as the horseshoe vortex, as well as lee-wake vortices, including their vertical frequency variation, are discussed. Large-scale counter-rotating streamwise phase-averaged vortices in the lee wake are likewise demonstrated via numerical flow visualization. These features are linked to scour around a vertical pile in a steady current.

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