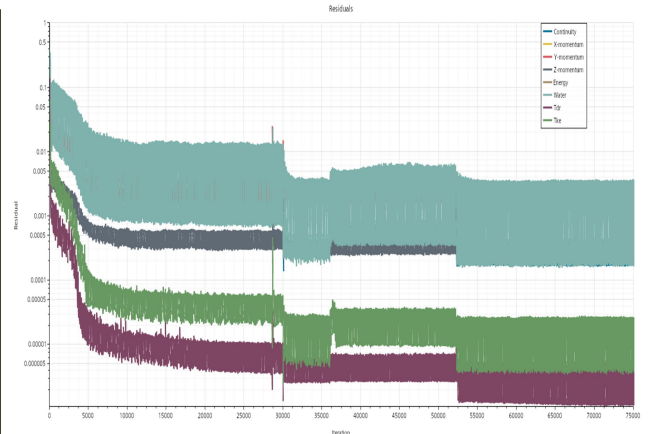




CENTRAL WATER AND POWER RESEARCH STATION

NUMERICAL STUDIES ON TAILING DAM PUMP HOUSE AT IRON ORE BENEFICIATION PLANT FOR NMDC BACHELI CHHATTISGARH THROUGH KALPATARU PROJECTS INTERNATIONAL LIMITED



STUDY OVERVIEW

To verify the adequacy of hydraulic design of pump intake to have vortex / swirl free flow in to the bell mouth entry section of the pump. Ensuring adequacy of spacing between pumps, width of the pump bay, side and bottom clearance, back clearance, etc.

APPROACH

Computational Fluid Dynamics (CFD), uses the general fluid flow equations such as the Navier-Stokes and continuity equation to predict the flow field, turbulence, vorticity, and other related hydraulic phenomena. The numerical solutions for the Reynolds-Averaged Navier-Stokes (RANS) equations were performed using STAR CCM+ CFD code. Turbulence flow properties were described using K - Epsilon Turbulence model. The free surface is tracked by means of the Volume of Fluid (VOF) multiphase model. The general procedure followed in performing the CFD analysis is Geometry construction, Mesh Generation, Boundary conditions.

KEY FINDINGS

Based on the studies it is concluded that the compartments of pump house have a significantly higher submergence for the bell mouth entry from the free surface. No evidence of abnormal flow conditions like mass / bulk circulations, flow separations were observed in the reservoirs.

IMPACT/SIGNIFICANCE/ OUTCOME

The study concludes a scope for implementation of anti-vortex devices so the preventive measures may be taken into consideration for avoiding the entry losses

